The Laboratory of Functional Medicine

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Financial Disclosures-No Relevant Relationships with a Commercial Interest to Disclose

Objectives

1. Lab Values-"Normals" vs. Optimals
2. Serum laboratory Studies with "Normals," "Optimals" and Remedies
    a. Laboratory Calculations
1. Stress-24 hour Salivary Cortisol Level
2. The Functional GI Test
    a. SIBO Breath Test
3. Mucosal Barrier Assessment
4. Metabolic Wellness
5. Food Sensitivities IgG-Delayed Sensitivities)
6. Toxicities
    a. Heavy Metal
    b. Mold-Serum IgG, IgE; Urine
    c. Environmental
7. Micronutrients

Serum Laboratory Evaluation (1)

- Hormone ranges are based upon pooled data.
- "Standard" range is defined as two Standard Deviations from a randomized mean.
- Two standard deviations is 95.4% of a Sample
  - One Standard Deviation = 68.27%
  - Three Standard Deviations = 99.73%
- Ranges may be narrow; i.e.
  - Postmenopausal Progesterone (0.1-0.8 ng/ml)
- Ranges may be broad; Total Testosterone: 264 to 916 ng/ml. (New)

Laboratory Evaluation

“ The Optimal Physiological Level”

Hormone levels should be centered around the median level of its acceptable range.

The ideal net effect is that the levels are close to the median of the range

Laboratory Evaluation

"The Optimal Physiological Level"

Major National Lab [2]

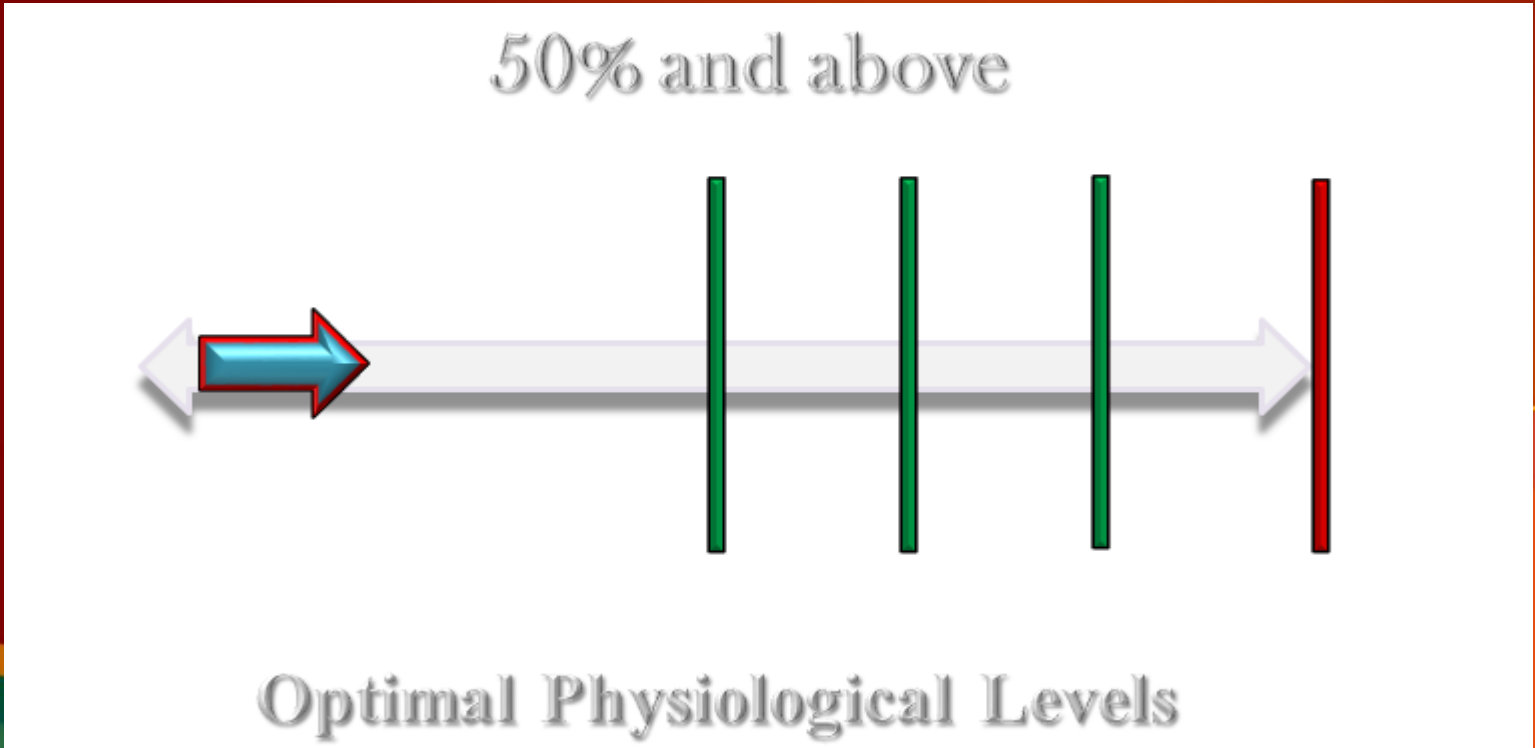
Total Testosterone Range (264-916)=1180/2 = 590 Median

(Prior to July 17, 2017 Range (348-1197)= 772.5 Median

"Range lowered due to obesity crisis showing improvement w low testosterone levels"

"The Optimal Physiological Level"

Goal is in Upper ½ to ¾ of Median



Lab Studies

Central	*Peripheral*
General	CBC, Chem Profile, Insulin, HbA1C, Lipid Profile, cRP, Homocysteine, 25-OH Vit D, Pregnenolone, PSA (Total and fractionated), Prolactin
TSH	Free T3, free T4, Reverse T3, TPO, Antithyroglobulin, TSI (If S/S =Hyperthyroid) Spot Urine Iodine
LH/FSH	Testosterone, (free, total) DHEA-S, SHBG; Male-DHT, Estradiol, Progesterone Female-Estrone, Estradiol, Progesterone
ACTH	Cortisol A.M. and P.M. or 4 Point Cortisol Saliva Test
GH	IGF-1, (Main) Growth Hormone, (Before 10 AM), IGFBP3
Others	RBC-Magnesium, RBC-Zinc, ESR, LDH total and fractionated LP-PLA2, Myeloperoxidase (MPO),NTX (urine or serum)

Laboratory “Normals” and “Optimals”

Hormone Testing	Normal	Optimal
Growth Hormone	0-10 ng/ml	5 ng/ml*
Somatomedin C (IGF-1)	116-410 ng/ml	200-250ng/ml*
IGFBP-3	2752 – 6219 ng/ml	4000 ng/ml*
Prolactin IU/ml	4.8-23.3 ng/ml	11-14 ng/ml
Zinc	56-134 mcg/dl	95 mcg/dL*
Vitamin D3	30-100 ng/dl	50-80 ng/dl*
Fasting Blood Sugar	65-99 ng/dl*	Optimal 65-84 ng/dl
Insulin	2.6-24.9 mIU/L	Goal : < 5 mIU/L
Future Risk	32%	0%
Insulin Resistance FBS X Fasting Insulin/405	<2.9	Goal <1.9
Potassium	3.5-5.3 mmol/L	3.5-5.3 mmol/L
Hemoglobin A1C	4.0-5.6 %	<5.2%
Pregnenolone	15-132 ng/dL	90-110 ng/dL

Laboratory “Normals” and “Optimals”

Thyroid Values

TSH	0.45-4.5 mU/L	0.8-2.0 mU/L*
T4, Free	0.9-1.7 ng/dL	1.1-1.45 ng/dL*
T3, Free	2.0-4.4 pg/ml	Range 3.2-4.2 pg/l*
rT3	9.2-24.1 ng/dL	<15 ng/dL
fT3/rT3 Ratio	>1.06	>2.0
TPO	< 34 IU/ml	< 20 IU/ml
Antithyroglobulin	<1.0 IU/ml	<1.0 IU/ml
Thyroglobulin	0-0.9 IU/ml	
Ferritin	16-232 ng/ml	90-110 ng/ml
Spot Urine Iodine	28-544 ug/L	100-199 ug/L
Vit. B12	232-1245 pg/ml	>800 pg/ml
Folic Acid	>3.0 ng/ml	>4 ng/ml
Iron Sat	15--55%	15-55%
Cortisol	6.2-19.4 ug/dL A.M.	< 8.45-17.1 ug/dl AM
Uric Acid	3.0-7.2 MG/Dl	3.0-6.0 MG/Dl
GABA (urine test)	*2.0-5.6 nmol/gm*	2.5-5.09 nmol/gm
GABA (plasma)	0.0-0.3 umol/L	0.0-0.3 umol/L

Laboratory “Normals” and “Optimals”

Cortisol	6.2-19.4 ug/dL A.M.	< 8.45-17.1 ug/dl AM
Uric Acid	3.0-7.2 MG/Dl	3.0-6.0 MG/Dl
GABA (urine test)	*2.0-5.6 nmol/gm*	2.5-5.09 nmol/gm
GABA (plasma)	0.0-0.3 umol/L	0.0-0.3 umol/L
CRP	0-3 mg/L	<1 mg/L
Homocysteine	*< 11 umol/L*	<10 umol/L
Hematocrit	34-46.6 %	34-46%
WBC	3.8-10.8 thousand/uL	
MCV	79-97 FL	79-97 FL
FSH	1.5-12.4 mIu/ml	7 mIU/ml*
LH	1.24-7.8 mIU/ml	5.1 mIU/ml

Laboratory “Normals” and “Optimals”

Female

For Females Add:		
Testosterone	2-45 ng/ml	30-40 ng/ml
Testosterone, Free	0.1-4.0 pg/ml	2-4 pg/ml
Free Androgen Index=(Tot Tes)/(SHBG x0.288)		
Free Androgen Index	0.4-8.4	2.91-5.89
SHBG	25-122 pg/mL	25-122 pg/mL
DHEA	41-243 ug/dL	200-250 ug/dL
Estrone (E1)	calculate ratios	< 100 pg/ml*
Estradiol (E2)	calculate ratios	calculate ratios
Progesterone	0.1-0.8 ng/ml	5-7 ng/ml*
E/P Ratio (E1 +E2)/P		<250
P/E Ratio (P x 1000)/E2		100-500

Laboratory "Normals" and "Optimals"

Males

For Male Add:		
DHEA-S	22-372 ug/dL	275-372 ug/dL
Pregnenolone	<151 ng/dL	90-110 ng/dL
Testosterone Free	30-135 PG/ML	pg/mL
Testosterone Total	264-916 ng/dL	700-900 ng/dL
DHT	14-77 ng/dL	30-61ng/dl*
Sex Hormone Binding Gb	10-57nmol/L	< 45 nmol/L
Free Androgen Index=(Tot Tes)/(SHBG x0.288)		
Free Androgen Index (FAI) *	30-130	53-107.2
Prostatic PSA	<4.0 ng/ml	<4.0ng/ml
FSH	1.5-12.4 mlu/ml	7 mIU/ml*
LH	1.24-7.8 mIU/ml	5.1 mIU/ml
Estradiol (E2)	5-40 pg/ml	15-25 pg/ml
Estrone (E1)	9-36 pg/ml	14.85-30.15 pg/ml
Progesterone	>0.01 ng/ml	0.3-1.3 ng/ml
T/E2		>20/1

Laboratory “Normals” and “Optimals”

Lipids and Others

Cholesterol	100-199 mg/dL	100-199 mg/dL	
Triglyceride	0-149 mg/dL	0-149 mg/dL	
HDL Cholesterol	>40 mg/dL	>60 mg/dL	
LDL Cholesrterol	<100 mg/dL	><100 Mg/dL	
Anything Else			

Considerations with Laboratory Results

1. *CRP-c Reactive Protein* marker for inflammation-elevated in vascular disease. (3)
   a. "Normal cRP" 0-3 mg/dL Optimal cRP <1.0 mg/dL

   Rx: (1) Omega 3-FA 1000 mg 1-2 in am, 1-2 in PM (2) Curcumin 500 mg 1-2in am, 1-2 in pm

1. *Blood Sugar-*(4)
   a. *"Past" = HbA1C Average over 3 months-"Normal" < 5.7% "Optimal" < 5.3%*
   b. *"Present" =FBS "normal 65-99 mg/dL "Optimal 65-84 mg/dL*
   c. *"Future" Ever point over 84 = 4% risk of Glucose dysfunction within 5-10 yr.*

      Ex: FBS 94 ⇧ Risk=94-84=10 x 4%=40% of Glucose dysfunction in 5-10 yr.

1. *Insulin-* (5)
   a. *"Normal" 2.6-24.9 mIU/mL "Optimal" <5 mIU/mL*
   b. Insulin Resistance=(FBS x Fasting inulin)/405
   c. "Normal IR < 2.9 "Optimal" IR < 1.9

The Laboratory of Hormones

4. *Homocysteine-* ↑ = B complex or folic acid deficiency. Damages arteries, increases the risk of blood clotting, strokes, heart attacks and diminished limb circulation *(6)*
   a. "Normal Homocysteine < 11 mcmol/L "Optimal Homocysteine" < 10 mcmol/L
      Rx: Methylated B6, B12, Folic Acid

4. *Vitamin D3-* Aids calcium absorption/ bone strength, immune function, heart, brain and blood vessel integrity, insulin regulation and mood stabilization. A pro-hormone it aids in processing of cortisol and growth hormone. A sleeping "aid." *(7)*
   a. "Normal" Vitamin D3-30-100 ng/mL "Optimal" 50-80 ng/mL

4. *Estrogens* *(8)*
   a. *Estrone*-Predominant estrogen after hysterectomy Goal < 100 pg/mL
   b. *Estradiol-Generator of female characteristics*, skin, hair, nails, breasts, voice
      i. Male E2 = Normal < 40 pg/mL Optimal 15-25 pg/mL
      ii. Female-See formula for calculations into "normal" and "Optimal" Under Progesterone

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7. *Progesterone*-Predominant hormone in second half of cycle (ng/mL) (9)
   a. Low P = agitated, irritable, insomnia, poor libido, headaches, short tempered
   b. E/P = (Estrone+estradiol)/Progesterone Goal < 250
   c. P/E= 1000 x P/E2 *100-500 Goal* < 100 = Estrogen Dominant;

      > 500 = Progesterone Dominant

7. *Testosterone*-Predominant male hormone. Strength, energy, sense of well being, anxiety, depression, Poor ibido, poor sexual function, mental clarity, joint pain (10)
   a. Total "Normal" Male 264-916 ng/dL "Optimal" 700-900 ng/dL
   b. Total "Normal Female" 2-45 ng/dL "Optimal" 30-40 ng/dL

7. *Sex Hormone Binding Globulin*-Transport protein carries T to tissues (Measured as nmol/L)

   Free Androgen Index = Total Testo/(.288 x SHBG) (11)

      i. Male Normal 30-130 Optimal 53-108 Female N = 0.4-8.4 Opt =2.91-5.89

      To lower SHBG = Boron 5-10 mg/d

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10. DHEA-[12]

j. Precursor with Pregnenolone to Androgens/Estrogens
k. After 6mo.-1 yr. therapy and on Testo or estrogens, develop negative feedback. Usually D/C DHEA
l. A neuroactive steroid, regulates mood, supports the immune system, improves insulin sensitivity

"Normal Male" 95-345 ug/dL "Optimal Male" 275-345 ug/dL

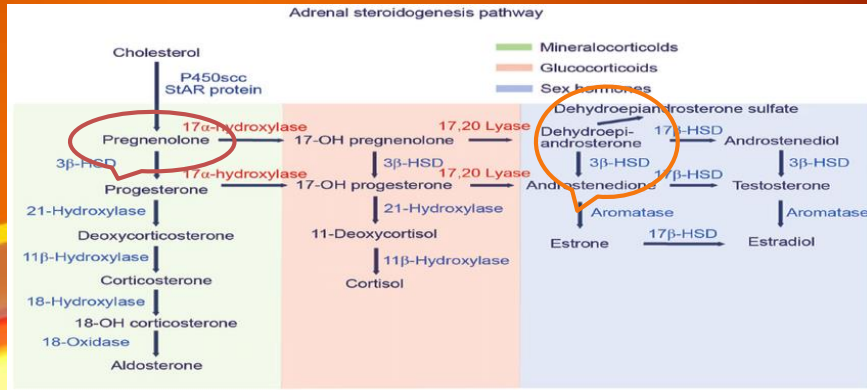
"Normal Female" 65-300 ug/dL "Optimal Female" 200-250 ug/dL

Rx: Male 25-100 mg. @ bedtime Female: Rx: 5-25 mg @ bedtime

10. Pregnenolone-[13]

j. "Mother" Hormone-Precursor to Progesterone, Cortisol, Androgens, Estrogens, Aldosterone
k. Learning, Memory, Cognitive Performance
l. Normal 33-248 ng/dL Optimal 90-110 ng/dL

Rx: Pregnenolone 30-100 mg/ day



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12. *HCT*-% of Red Blood Cells in a Given Blood Volume [14]

Male: 41.5-50.4% Female: 35.9-44.6%

Increases w Testosterone Rx. > 55% Rx: Phlebotomy

13. *MCV*-Measures Average Size of RBC [15]

Normal 80-97 fl <80 fl= iron deficiency anemia > 97 fl = Pernicious (B12, folic acid deficiency) Anemia

14. *Prolactin*-For TBI Purposes PRL Measures Treatment Resistant Anxiety/Depression [16]

Normal 11-14 ng/mL High (>25) = Pituitary Adenoma, Breast Feeding > 25 and up needs Evaluation

Low (<6) = Treatment Resistant Anxiety/Depression

15. *IGF-1* Active Portion of Growth Hormone [17]

Goal 200-250 ng/mL

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16. Thyroid [18]

j. *TSH-*"The Detective" Lab Value is an Inverse "Normal" 0.4-4.5 mU/L "Optimal" 0.8-2.0 mU/L
k. *free T3-*Usable portion of Thyroid "Normal" 2.0-4.2 pg/mL "Optimal" 3.4-4.2 pg/mL
l. *free T4-*"Storage Component of Thyroid "Normal" 0.82-1.77 ng/dL "Optimal" 0.85-1.73 ng/dL
m. *reverse T3* [19]*-*Inert Portion of T3 Due to High Cortisol (90%) Etiology or Glucose Dysregulation (10%)

"Normal" 0.82-1.77 ng/dL "Optimal" 9-24.9 ng/dL

Symptoms + >15 ng/dL

j. *Low T3 Syndrome* [20] - fT3/rT3 "Normal" > 1.06 "Optimal" > 2.00 < 1.06 = Neuroinflammation
k. *TSHi* [21] *= (0.1345 *T4) + TSH* "Normal" 1.3-4.1

"Low" < 1.3 = Central Issue -Trauma/Neuroinflammation

"High" > 4.1 = Peripheral thyroid issue

j. *TPO/Thyroid Antiglobulin-*Autoimmune Antibodies (TPO/TAG=HAshimoto's-TSI=Graves
1. TPO "Normal" Lab A. < 34 IU/mL Lab B < 9 IU/mL
2. Antithyroglobulin- "Normal" < 1.0 IU/mL

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16. Thyroid

Iron and Protein Components Necessary for Optimal Thyroid Production and Utilization

j. *Ferritin* [22]– "Optimal" 90-110 ng/mL < 50 = iron store deficiency w disruption of thyroid production

j. *B12* [23]– *"Normal"* 160-950 pg/mL "Optimal" > 700 pg/mL

j. *Folic Acid* [24]– *"Normal"* 2-17 ng/mL "Optimal" > 5 ng/mL

Spot Urine Iodine [25] *"Normal"–28-544 mcg/L* "Optimal" 100-199 mcg/L

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17. Cardiovascular Markers

i. Lp PLA2 [26]

(O: < 200, M: 200-234, H: > 234)

1. Plaque vulnerability; Atherogenesis, Pro-inflammatory, Prognostic of acute CV events
2. RX: Niacin, O3 F.A., Statins, Fibrates

ii. Myeloperoxidase-MPO [27]

(O: < 350, M: 350-633, H: > 633)

1. Plaque rupture
2. AGE, Curcumin, POM Seeds, Quercetin

Miscellaneous Lab Tests

The Laboratory of Hormones

18. LDH (115)

a. Converts lactate into pyruvate during cellular respiration
b. Helps muscles produce energy during exercise or strenuous activity
c. Excess LDH = tissue damage
d. "Normal" 120-220 IU/L "Optimal" 140-180 IU/L

18 A. LDH Isoenzymes (116)

"Normal" Value

A. LDH 1 (Heart, Red blood cells, Kidney) 17-32%
B. LDH 2 (Heart, red blood cells, Kidney (lesser amounts than LDH1) 25-40%
C. LDH 3 (Lungs and other tissues) 17-27%
D. LDH 4 (White blood cells, lymph nodes, kidney, pancreas (muscle, liver, < LDH 5) 5-13%
E. LDH 5 (Liver, Skeletal, Muscle) 4-20 %

Disease Progression

ESR + CRP + LDH = Increasing numbers each measuring period = Increasing Disease Load

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19. MCH (Mean Corpuscular Hemoglobin) (117)
    Normal = 27-31 pg/cell
    a. High = B12 deficiency, macrocytic anemia High > 34
    b. Low = Leaky gut Low <26
        i. Diminished absorption of B 6, Zinc, Magnesium
20. MCHC (Mean Corpuscular Hemoglobin) (118) Normal = 33-36 gm/dl
    a. High = Methylation defect, B12 deficiency, macrocytic anemia High > 36
    b. Low = Hypochromic anemia, Leaky gut, Spherocytosis Low <33
        i. Diminished absorption of B 6, Zinc, Magnesium
21. RDW (Red Cell Distribution Width) (119)
    Normal 12-15 %
    a. Measures variation in RBC Sizes
    b. High = Oxidative stress, Anemia, thalassemia, chronic diseases High > 14.5%

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24. Monocytes (122)

Normal 2-9%

a. High = Viral infection, Poor NK Cell function, Autoimmune Dx — High > 7%
b. Low = Immune dysfunction, Sepsis

Low <2%

25. Eosinophils (123)

Normal 30-500 cells/mcL

a. High = Allergies, infections, Cancers, Parasites, Alcoholism — High > 500
b. Low = Normal

26. Basophils (124)

Normal 0-1%

a. Histamine Containing Cells-Function as Mast Cells
b. High = Allergies, Protect against Parasites Venom Bites, Hyperthyroidism
c. Low = Injury, Cancer

27. High Basophils + High Monocytes + High eosinophils = Parasites, gut dysbiosis (125)

28. Urine NTX, or Serum CTX (126)

a. *High NTX Levels:* Elevated NTX levels indicate increased bone resorption.
   i. Osteoporosis, Hyperparathyroidism, Paget's Disease, Multiple Myeloma, Metastatic Bone

Calculations

1. ***Thyroid/Cortisol Proxy Ratio*** *(28-29)*
    a. ***Calculation free T3 x 10/Reverse T3***
    b. **"Normal" > 2.0**

Elevated rT3 due to:

Elevated Cortisol

B12 deficiency

Low Ferritin

Low Iron

Diabetes

2. TSH Index=TSH + 0.1345 (free T4) [20-21]

a. Range = 1.3 – 4.1
b. <1.3 = Central (Brain) Issue
c. >4.1=peripheral issue
    i. (Cortisol▲
    ii. Selenium ▼, Iodine▼

TSH	**0.875 N**	<2.5 mcu/ml*
T3, Free	**2.1 LN**	> 2.5 pg/ml
T4, Free	**0.90 LN**	> 1.5 ng/ml
rT3	**217 HN**	80-250 pg/ml
T3/rT3 Ratio	**0.96 L**	>1.06
TPO	**13.0 N**	<35

Ex: **Low T3 Syndrome**

TSH <1.0;

T4 and T3 < median

Elevated rT3

High Cortisol

T3/rT3 Ratio below 1.06.

Low T3 etio. is Pituitary Trauma

3. Insulin Resistance (FBS x Fasting Insulin/405) [5]

a. <2.9 =normal
b. <1.9 = optimal

Ex: FBS = 97 (Normal 65-99)
Insulin=17 (2.6-24.9)
I.R. = 4.07

I.R. is Independent of HbA1C

Ex. FBS = 101
Insulin = 4.8
I.R. = 1.197

3A. Future Glucose Abnormality Risk [4]

Every point over (FBS) 84 = 4% risk of Glucose dysfunction within 5-10 yr.

Ex: FBS 94 Risk=94-84=10 x 4%=40% of Glucose dysfunction in 5-10 yr.

Bansal, Nidhi. "Prediabetes diagnosis and treatment: A review." *World journal of diabetes* vol. 6,2 (2015): 296-303. doi:10.4239/wjd.v6.i2.296

4. Estrogen/Progesterone Ratio (30-31)

- **Optimal time to perform lab testing:**
  - **E1, E2, P Days 19-21 of cycle**
  - **LH/FSH Day 2-3 of cycle**
  - **Menopausal=Any day**

E1+E2/Prog.=E/P Ratio

Goal <250

E1= 37 **Median=<200 pg/ml**

E2= 21
= 90 pg/ml

Prog= 1.1
= 5-7 ng/ml

P/E= 52.2

Estrogen Dominant

E1= 86

E2= 112

Prog=0.04

P/E = 2886

Estrogen/Progesterone Ratio (31)

Symptoms	*<250*	*250-1000*	*1000-5000*	*>5000*
Headaches	**Intermittent**	**Mild**	**Moderate**	**Severe**
Sleep Issues	**Intermittent**	**Mild**	**Moderate**	**Severe**
Sleep Deprivation	**NP**	**Intermittent**	**Mild**	**Moderate**
Bloating	**NP**	**NP**	**Mild**	**Moderate**
Mood Swings	**NP**	**Mild**	**Moderate**	**Severe**
Anxiety	**NP**	**Intermittent**	**Mild**	**Severe**
Depression	**NP**	**Intermittent**	**Mild**	**Severe**
Panic Attacks	**NP**	**Intermittent**	**Mild**	**Severe**
Mastalgia	**Intermittent**	**Mild**	**Severe**	**Severe**

5. Progesterone/Estrogen Ratio [32] (Estrone Not Available)

- **Optimal time to perform lab testing:**
  - **E1, E2, P Days 19-21 of cycle**
  - **LH/FSH Day 2-3 of cycle**
  - **Menopausal=Any day**

❖ ***Prog. x 1000/Estradiol***
- ➢ ***< 100=Estrogen Dominant***
- ➢ ***100-500=Normal***
- ➢ ***> 500=Prog. Excess***

Normal

E2 = 62 Median=90 pg/ml

Prog.= 7.6 =0.45

P x 1000/ E2 =122.58

Estrogen Dominant

E2=38 Median=90 pg/ml

Prog.= 0.8 =
0.45

P x1000/E2 =21.05

6. FAI=Total Testosterone/(SHBG X .288) (11)

Free Androgen Index	Test	Normal	Optimal
Male	Serum tot. testo/(SHBG x 0.288)	30-130	52.8-107.2
Female	Serum tot. testo/(SHBG x 0.288)	0.4-8.4	2.0-5.0

Miscellaneous Calculations

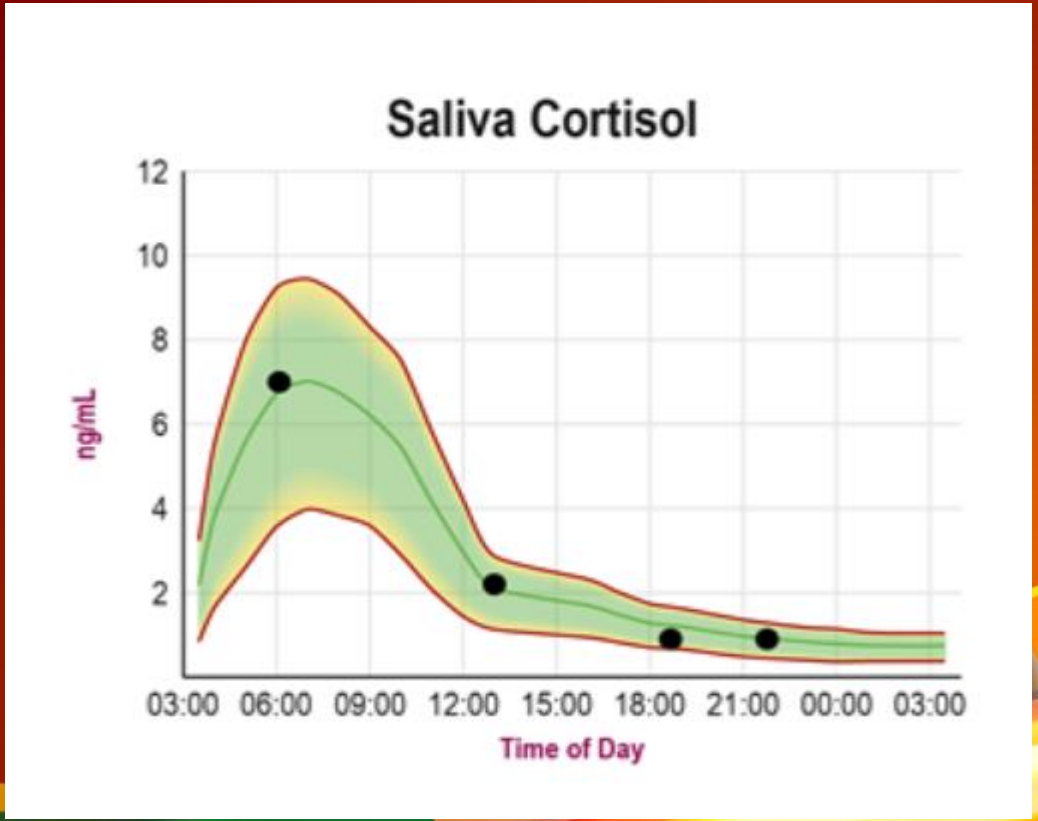
7. *ESR + CRP + LDH = Increasing numbers each measuring period = Increasing Disease Load*
8. *Low RBC + Low Hct + Low Hg + Low Platelets = Bone Marrow Suppression.* (120)
9. *High Basophils + High Monocytes + High eosinophils = Parasites, gut dysbiosis* (125)

Advanced Testing

1. *24 Hour 4 Point Cortisol Test*
2. *Functional GI Test*
    a. *SIBO Breath Test*
3. *Mucosal Barrier Assessment*
4. *Metabolic Wellness*
5. *Food Sensitivities IgG-Delayed Sensitivities)*
6. *Toxicities*
    a. *Heavy Metal*
    b. *Mold-Serum IgG, IgE; Urine*
    c. *Environmental*
7. *Micronutrients*

24 Hour Saliva Cortisol Test [33]

Saliva is representative of the bioavailability of cortisol to target tissues throughout the body.

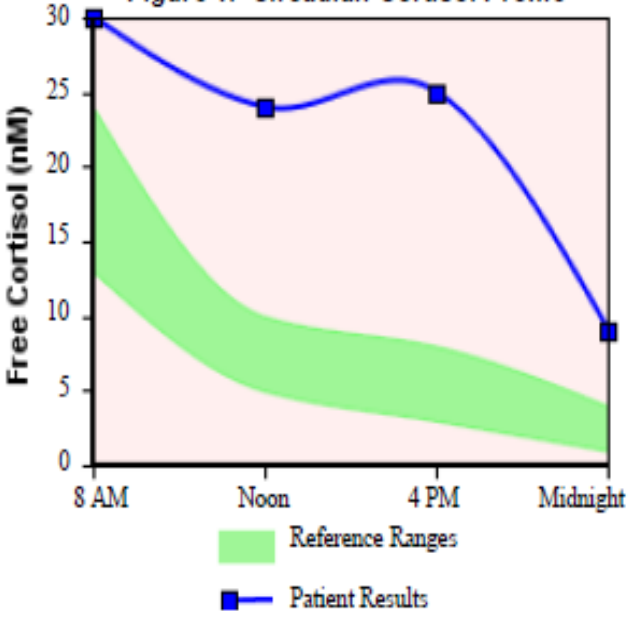


Cortisol Excess

Test	Description	Result		Ref Values
ASI	Adrenal Stress Index (Original) - Saliva			
TAP	Free Cortisol Rhythm - Saliva			Adults (M/F):
	06:00 - 08:00 AM	39	Elevated	13-24 nM
	11:00 - 1:00 PM	24	Elevated	5-10 nM
	04:00 - 05:00 PM	25	Elevated	3-8 nM
	10:00 - Midnight	9	Elevated	1-4 nM
	Total Cortisol Output:	97		***22 - 46 nM***

The Total Cortisol Output is the sum of the four cortisol values. Elevated values may indicate hypercortisolism or exogenous exposure, and low values suggest adrenal hypofunction.

Figure 1. Circadian Cortisol Profile

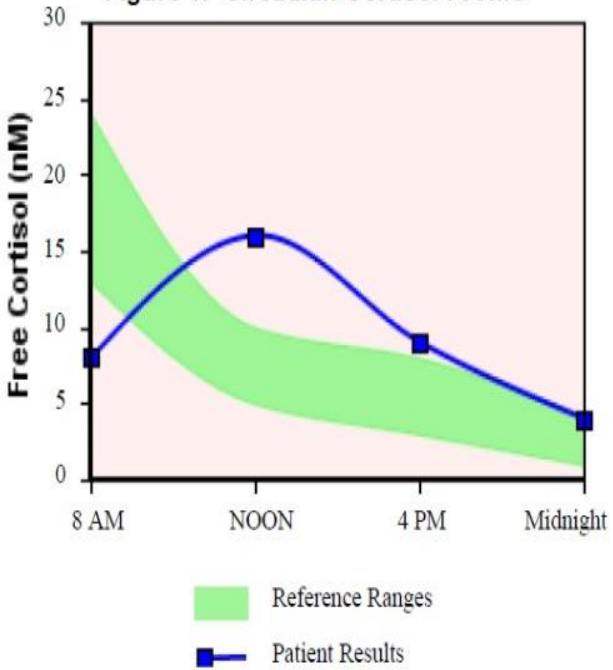


Cortisol Excess-6 Months Later

Test	Description	Result		Ref Values
TAP	**Cortisol rhythm (saliva)**			
TAP	**Cortisol rhythm (saliva)**			**Adults (M/F):**
	06:00 - 08:00 AM	8	Depressed	13-24 nM
	11:00 - 1:00 PM	16	Elevated	5-10 nM
	04:00 - 05:00 PM	9	Elevated	3-8 nM
	10:00 - Midnight	4	Normal	1-4 nM
	Total Cortisol Output:	37		***22 - 46 nM***

The Total Cortisol Output is the sum of the four cortisol values. Elevated values may indicate hypercortisolism or exogenous exposure, and low values suggest adrenal hypofunction.

Figure 1. Circadian Cortisol Profile



Cortisol Deficiency

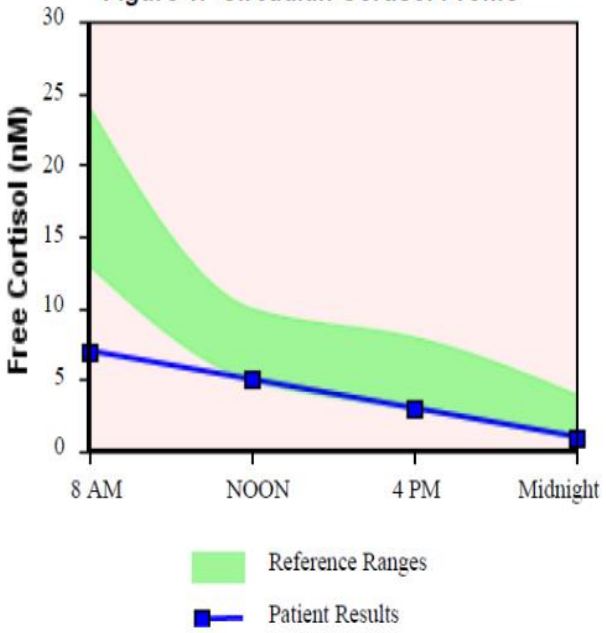
Test	Description	Result	Ref Values

TAP **Free Cortisol Rhythm - Saliva**

TAP	Free Cortisol Rhythm - Saliva			Adults (M/F):
	06:00 - 08:00 AM	7	Depressed	13-24 nM
	11:00 - 1:00 PM	5	Normal	5-10 nM
	04:00 - 05:00 PM	3	Normal	3-8 nM
	10:00 - Midnight	1	Normal	1-4 nM
	Total Cortisol Output:	16		***22 - 46 nM***

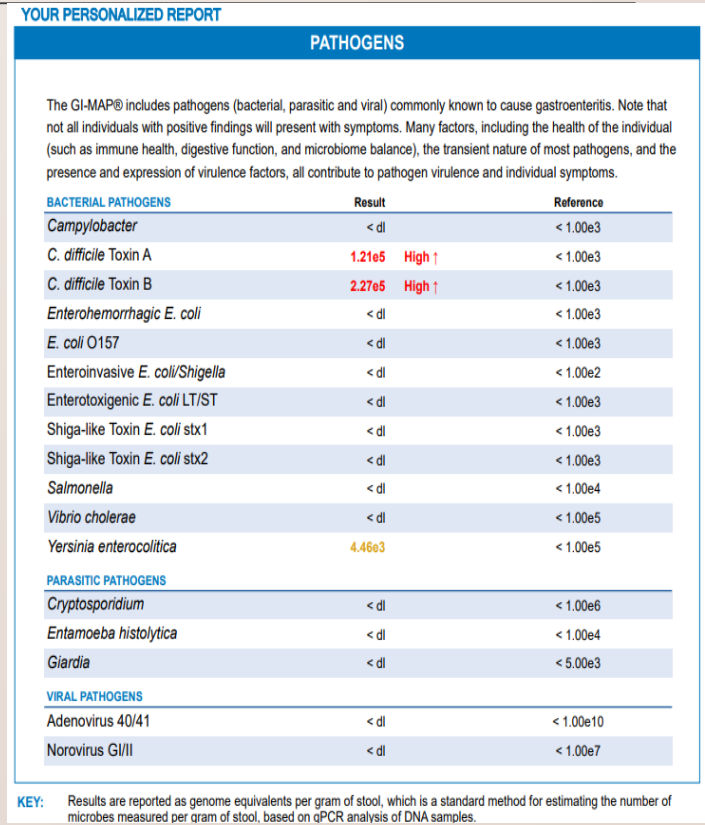
The Total Cortisol Output is the sum of the four cortisol values. Elevated values may indicate hypercortisolism or exogenous exposure, and low values suggest adrenal hypofunction.

Figure 1. Circadian Cortisol Profile



Comprehensive Stool Testing (34-37, 114)

- **The Comprehensive Stool Test (CST)**
  - **Quantitative polymerase chain reaction (qPCR)**
  - **DNA of 40+ microbes measured**
    - *Provides colony forming units per gram (CFU/g) Count*
  - **Markers for Absorption, Digestion, Inflammation, Immune**
  - **Commensal Bacteria-Low Levels Indicate Dietary Issues**
  - **Phyla-*Bacteroidetes*, *Firmicutes*, *Firmicutes:Bacteroidetes* Ratio**
    - **Increased Ratio = weight gain and obesity**
    - **Decreased insulin sensitivity; increased inflammation.**



YOUR PERSONALIZED REPORT

PATHOGENS

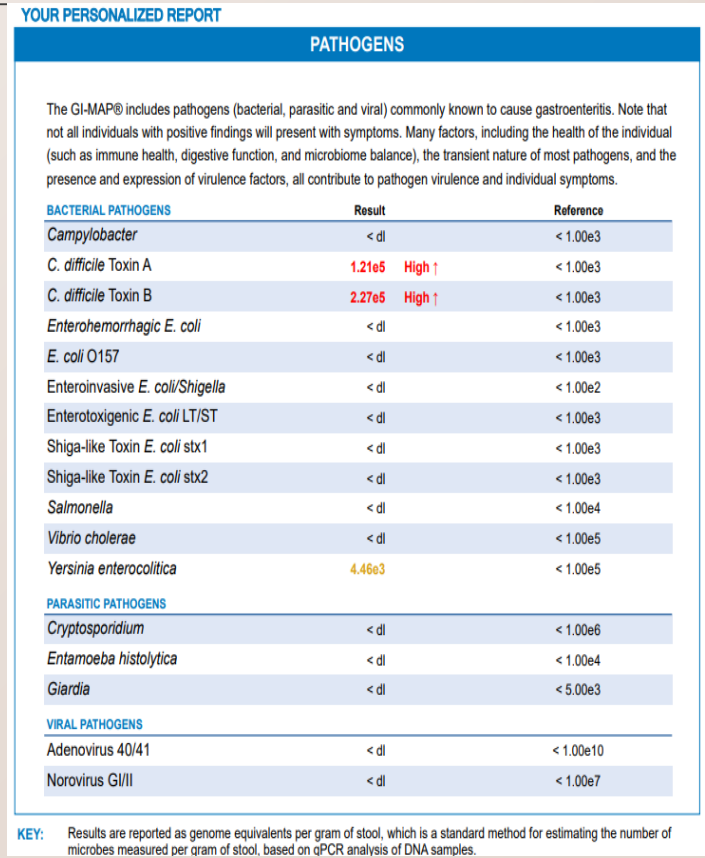
The GI-MAP® includes pathogens (bacterial, parasitic and viral) commonly known to cause gastroenteritis. Note that not all individuals with positive findings will present with symptoms. Many factors, including the health of the individual (such as immune health, digestive function, and microbiome balance), the transient nature of most pathogens, and the presence and expression of virulence factors, all contribute to pathogen virulence and individual symptoms.

BACTERIAL PATHOGENS	Result		Reference
Campylobacter	< dl		< 1.00e3
C. difficile Toxin A	1.21e5	High ↑	< 1.00e3
C. difficile Toxin B	2.27e5	High ↑	< 1.00e3
Enterohemorrhagic E. coli	< dl		< 1.00e3
E. coli O157	< dl		< 1.00e3
Enteroinvasive *E. coli/Shigella*	< dl		< 1.00e2
Enterotoxigenic *E. coli* LT/ST	< dl		< 1.00e3
Shiga-like Toxin *E. coli* stx1	< dl		< 1.00e3
Shiga-like Toxin *E. coli* stx2	< dl		< 1.00e3
Salmonella	< dl		< 1.00e4
Vibrio cholerae	< dl		< 1.00e5
Yersinia enterocolitica	4.46e3		< 1.00e5
PARASITIC PATHOGENS			
Cryptosporidium	< dl		< 1.00e6
Entamoeba histolytica	< dl		< 1.00e4
Giardia	< dl		< 5.00e3
VIRAL PATHOGENS			
Adenovirus 40/41	< dl		< 1.00e10
Norovirus GI/II	< dl		< 1.00e7

KEY: Results are reported as genome equivalents per gram of stool, which is a standard method for estimating the number of microbes measured per gram of stool, based on qPCR analysis of DNA samples.

Comprehensive Stool Testing (34-37, 114)

- ***Firmicutes:Bacteroidetes* Ratio (114)**
  - **Normal 1:1 to 2:1**
  - **High Ratio**
    - **Obesity,**
    - **Metabolic Disorders (DMT2, IR)**
    - **GI Inflammation *(SAD Diet)***
  - **Low Ratio**
    - **Weight Loss, Lean Body Type *(High fiber diet)***
    - **Inflammatory Bowel Diseases**
    - **Malnutrition (Dysbiosis)**



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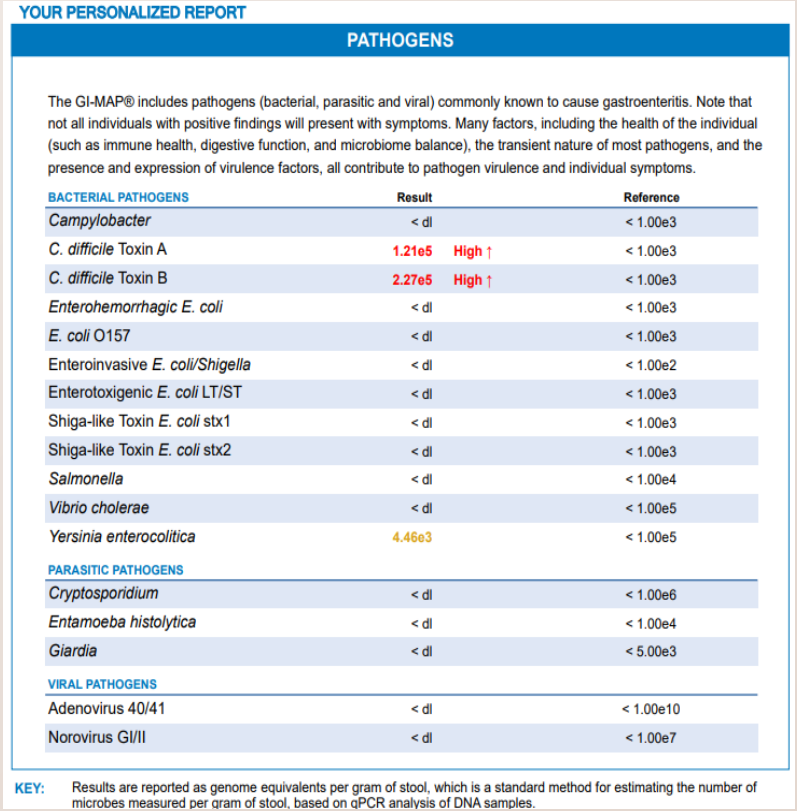
Comprehensive Stool Testing (34-37, 114)

- **The Comprehensive Stool Test (CST)**
  - **Pathogens Tested**
    - **Bacterial-***H. pylori, c. difficile* (144)
      - *Opportunistic, Dysbiotic-Staph, Strep, Pseudomonas*
      - *Inflammatory, Autoimmune Inducing-Citrobacter, Klebsiella*
    - **Viral Antigens-***Adenovirus 40/41, Norovirus GI/II*
    - **Yeast-***Candida spp.,Candida albicans,Geotrichum spp.,*
    - **Parasites & Worms-***Cryptosporidium, Entamoeba histolytica,*



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VIRAL PATHOGENS			
Adenovirus 40/41	< dl		< 1.00e10
Norovirus GI/II	< dl		< 1.00e7

KEY: Results are reported as genome equivalents per gram of stool, which is a standard method for estimating the number of microbes measured per gram of stool, based on qPCR analysis of DNA samples.

Comprehensive Stool Testing (34-37, 114)

Helicobacter pylori	**2.90e3**	**High ↑**	< 1.00e3
Virulence Factor, babA	**Positive**		Negative
Virulence Factor, cagA	**Positive**		Negative
Virulence Factor, dupA	Negative		Negative
Virulence Factor, iceA	Negative		Negative
Virulence Factor, oipA	Negative		Negative
Virulence Factor, vacA	Negative		Negative
Virulence Factor, virB	**Positive**		Negative
Virulence Factor, virD	**Positive**		Negative

COMMENSAL/KEYSTONE BACTERIA

COMMENSAL BACTERIA	Result	Reference
Bacteroides fragilis	8.98e10	1.6e9 - 2.5e11
Bifidobacterium spp.	1.89e10	> 6.7e7
Enterococcus spp.	2.45e7	1.9e5 - 2.0e8
Escherichia spp.	2.14e8	3.7e6 - 3.8e9
Lactobacillus spp.	6.55e6	8.6e5 - 6.2e8
Enterobacter spp.	2.07e6	1.0e6 - 5.0e7
Akkermansia muciniphila	**<dl L**	1.0e1 - 8.2e6
Faecalibacterium prausnitzii	5.66e5	1.0e3 - 5.0e8
Roseburia spp.	**7.91e5 L**	5.0e7 - 2.0e10
BACTERIAL PHYLA		
Bacteroidetes	1.21e12	8.6e11 - 3.3e12
Firmicutes	**4.70e10 L**	5.7e10 - 3.0e11
Firmicutes:Bacteroidetes Ratio	0.04	< 1.0

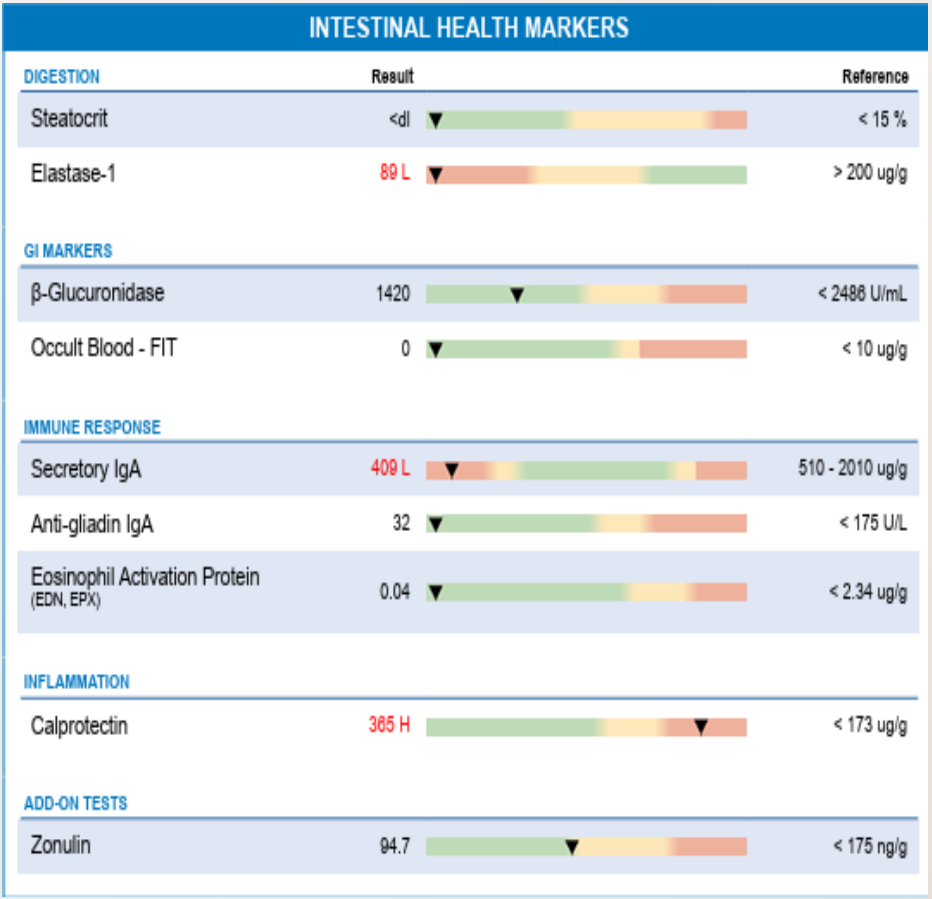
OPPORTUNISTIC/OVERGROWTH MICROBES

DYSBIOTIC & OVERGROWTH BACTERIA	Result		Reference
Bacillus spp.	**6.82e6**	**High ↑**	< 1.76e6
Enterococcus faecalis	**3.19e6**	**High ↑**	< 1.00e4
Enterococcus faecium	<dl		< 1.00e4
Morganella spp.	<dl		< 1.00e3
Pseudomonas spp.	<dl		< 1.00e4
Pseudomonas aeruginosa	<dl		< 5.00e2
Staphylococcus spp.	5.07e2		< 1.00e4
Staphylococcus aureus	**7.45e3**	**High ↑**	< 5.00e2
Streptococcus spp.	**2.98e4**	**High ↑**	< 1.00e3
COMMENSAL OVERGROWTH MICROBES			
Desulfovibrio spp.	3.36e8		< 7.98e8
Methanobacteriaceae (family)	1.67e8		< 3.38e8
INFLAMMATORY & AUTOIMMUNE-RELATED BACTERIA			
Citrobacter spp.	<dl		< 5.00e6
Citrobacter freundii	**8.47e6**	**High ↑**	< 5.00e5
Klebsiella spp.	**1.60e5**	**High ↑**	< 5.00e3
Klebsiella pneumoniae	**3.23e5**	**High ↑**	< 5.00e4
M. avium subsp. paratuberculosis	<dl		< 5.00e3
Proteus spp.	<dl		< 5.00e4
Proteus mirabilis	<dl		< 1.00e3
COMMENSAL INFLAMMATORY & AUTOIMMUNE-RELATED BACTERIA			
Enterobacter spp.	**5.63e8**	**High ↑**	< 5.00e7
Escherichia spp.	**6.08e9**	**High ↑**	< 3.80e9
Fusobacterium spp.	3.61e6		< 1.00e8
Prevotella spp.	9.58e6		< 1.00e8

FUNGI/YEAST

FUNGI/YEAST	Result	Reference
Candida spp.	<dl	< 5.00e3
Candida albicans	<dl	< 5.00e2
Geotrichum spp.	<dl	< 3.00e2
Microsporidium spp.	<dl	< 5.00e3

Biomarkers (127-136)



INTESTINAL HEALTH MARKERS

	Result	Reference
DIGESTION		
Steatocrit	<dl	< 15 %
Elastase-1	89 L	> 200 ug/g
GI MARKERS		
β-Glucuronidase	1420	< 2486 U/mL
Occult Blood - FIT	0	< 10 ug/g
IMMUNE RESPONSE		
Secretory IgA	409 L	510 - 2010 ug/g
Anti-gliadin IgA	32	< 175 U/L
Eosinophil Activation Protein (EDN, EPX)	0.04	< 2.34 ug/g
INFLAMMATION		
Calprotectin	365 H	< 173 ug/g
ADD-ON TESTS		
Zonulin	94.7	< 175 ng/g

Steatocrit–*Fecal Fat (High = Malabsorption)*

Elastase 1–*Pancreatic Enzymes*

B-Glucuronidase–*Dysbiosis, Liver Detox Impairment, Estrogen Induced Diseases*

Occult Blood–*+ = Present even if microscopic*

Secretory IgA–*Primary immune globulin in GI Tract*
High=Infection, Dysbiosis, Food Sensitivity
Low=Dysbiosis, Stress, Immune Compromise

Anti Gliadin IgA–*Immune Response to Gluten*

Eosinophil Activation Protein–*Infections, Allergic Rx*

Calprotectin–*IBD (Crohn's, U.C.)VS. IBS (Benign)*
"Gold Standard" Inflammatory Marker

Zonulin–*Intestinal Permeability*

Biomarkers

Steatocrit [127] – *Fecal Fat (High = Fat Malabsorption)*

- *Normal-<15%, High >15%*
- *RX: Pancreatic Enzymes; Bile Acid Replacement (*Ursodeoxycholic acid)

Elastase 1 [128] – *Non invasive marker for Exocrine Pancreatic Function*

- *Normal Pancreatic Function*: > 350 µg/g, *Declining* 200-350 µg/g; *Moderate Pancreatic Insufficiency*: 100-200 µg/g;
  - *Severe Pancreatic Insufficiency*: < 100 µg/g;
  - RX: Supplement with a wide spectrum of pancreatic enzymes

B-Glucuronidase [129] – *Enzyme linked to detoxification and estrogen metabolism, gut health and dysbiosis -Liver Detox Impairment, Estrogen Induced Diseases i.e. Estrogen Excess)*

- *Normal-< 2486 U/ml*
- *RX High-High fiber foods, Calcium-D-Glucarate (250-500 mg 2-3x/d), Balance gut flora (Pro-Postbiotics)*

Occult Blood [130] – *Detects microscopic blood in stool; Indication of GI Bleed*

Secretory IgA [131-132] – *Primary immune globulin in GI tract; Depicts mucosal immunity*

- *Normal-510 - 2010 ug/g*
- *High->2010 ug/g Infection, Dysbiosis, Food Sensitivity, Chronic Inflammation RX: Probiotics, Glutamine, Address Triggers*
- *Low-<510 ug/g Stress, Dysbiosis, Immune Deficiency RX: Stress Reduction, Vitamin D, Vitamin A, Zinc and Glutathione.*

Biomarkers

Anti-Gliadin IgA [133] *-Reflects immune response to gluten = Gluten sensitivity or Celiac disease*

- *Normal-<150-175 U/g*
- *High >150-175 U/g RX: Remove gluten from diet; Remove triggers*

Eosinophil Activated Protein [134] *-Marker of allergic or parasitic activity; Inflammation of the GI tract*

- *Normal -<2.34 ug/g*
- *High - > 2.34 ug/g RX: Elimination, low histamine diet; Remove food triggers; Treat allergies or parasites; DAO Inhibitors*

Calprotectin [135] *- "Gold Standard" to distinguish between IBD & IBS; Measures Intestinal Inflammation*

- *Normal -<173 ug/g*
- *High - ->173 ug/g RX: Repair gut lining (L-glutamine), GERD-Zinc Carnosine or DGL, Pre, Pro, Post biotics, Elimination Diet*

  RX; 5-aminosalicylate, corticosteroids, antibiotics, immunomodulators as indicated
- *IBD (High) vs. IBS (Low or normal)*

Zonulin [136] - Indicates intestinal permeability, i.e. Leaky gut

- *Normal - < 50 ng/ml*
- *High - >50 ng/ml RX; 4 R's, Anti-inflammatory Diet, Remove gluten*

Comprehensive Stool Testing

H. PYLORI ANTIBIOTIC RESISTANCE GENES

	Result	Reference
Amoxicillin	Positive	Negative
Genes associated with amoxicillin resistance		
PBP1A S414R	Present	
PBP1A T556S	Absent	
PBP1A N562Y	Absent	

	Result	Reference
Clarithromycin	Positive	Negative
Genes associated with clarithromycin resistance		
A2142C	Absent	
A2142G	Absent	
A2143G	Present	

	Result	Reference
Fluoroquinolones	Negative	Negative
Genes associated with fluoroquinolone resistance		
gyrA N87K	Absent	
gyrA D91N	Absent	
gyrA D91G	Absent	
gyrB S479N	Absent	
gyrB R484K	Absent	

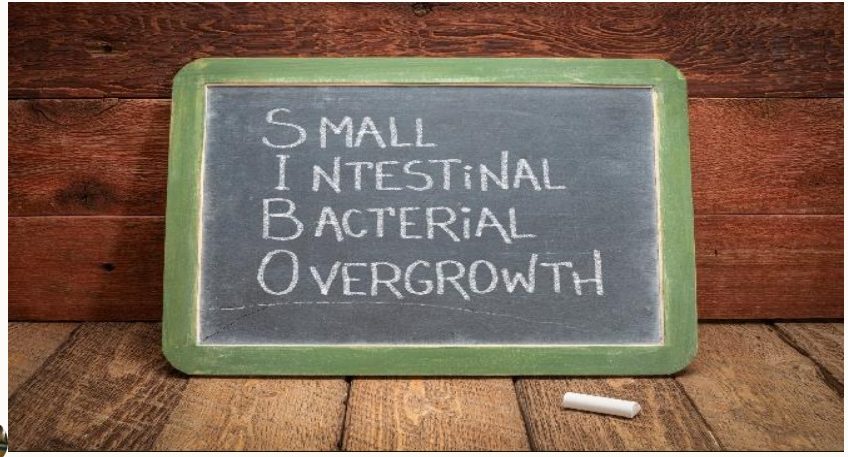
	Result	Reference
Tetracycline	Negative	Negative
Genes associated with tetracycline resistance		
A926G	Absent	
AGA926-928TTC	Absent	

PARASITES

PROTOZOA	Result	Reference
Blastocystis hominis	<dl	< 2.00e3
Chilomastix mesnili	<dl	< 1.00e5
Cyclospora spp.	<dl	< 5.00e4
Dientamoeba fragilis	<dl	< 1.00e5
Entamoeba coli	4.81e3	< 5.00e6
WORMS		
Ancylostoma duodenale	Not Detected	Not Detected
Ascaris lumbricoides	Not Detected	Not Detected
Necator americanus	Not Detected	Not Detected
Trichuris trichiura	Not Detected	Not Detected
Taenia spp.	Not Detected	Not Detected

137.https://www.rupahealth.com/biomarkers/h-pylori-virulence-factor-vird?_gl=1*94dt0g*_up*MQ..*_gs*MQ..&gclid=Cj0KCQiAsaS7BhDPARIsAAX5cSB15jl85p41XwIPdwgD1TgxtvC3gsfnOSdKh5SljjB9onhDRuU8vtIaAnxhEALw_wcB#section-2-significance-of-h.-pylori-virulence-factor-vird-as-a-biomarker-[10.,-13.]

Small Intestinal Bacterial Overgrowth (SIBO) (38-39)

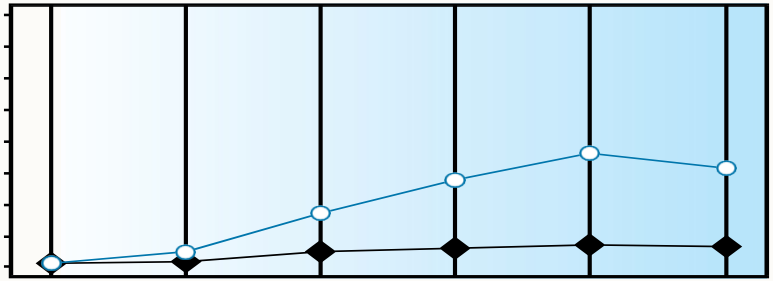


Evaluation for Hydrogen (H_2)		
Hydrogen increase over baseline by 90 minutes		
	Result	Expected Value
Change in H_2	70 <20 ppm	H
A rise of ≥ 20 ppm from baseline in hydrogen by 90 min should be considered a positive test to suggest the presence of SIBO.		

Evaluation for Methane (CH_4)		
Peak methane level at any point		
	Result Expected Value	
CH_4 Peak	13 <10 ppm	H
A peak methane level ≥ 10 ppm at any point is indicative of a methane-positive result.		

Small Intestinal Bacterial Overgrowth (SIBO)
2 Hour- Breath Test

Hydrogen (H2) and Methane Gases (CH4) Breath Gases



Hydrogen (H_2), Methane (CH_4), and Carbon Dioxide (CO_2) (ppm)						
	Baseline 0 min (S1)	20 min (S2)	40 min (S3)	60 min (S4)	90 min (S5)	120 min (S6)
H_2	2	9	33	55	72	62
CH_4	<2	3	9	11	13	12
H_2 + CH_4	NR	12	42	66	85	74
CO_2**						

Actual Collection Times						
Actual Time	9:34	9:54	10:14	10:34	11:04	11:34
Actual Interval	0 min	20 min	40 min	60 min	90 min	120 min

**CO_2 is measured for quality assurance. indicates the CO_2 level is acceptable. indicates room air contamination exceeding acceptable limits.

The Science of Behind SIBO Testing

A "Normal" Small Bowel is Sterile

Hydrogen (H_2)

- **Produced when bacteria ferment carbohydrates.**
- **Elevated levels indicate bacterial overgrowth in the SI**

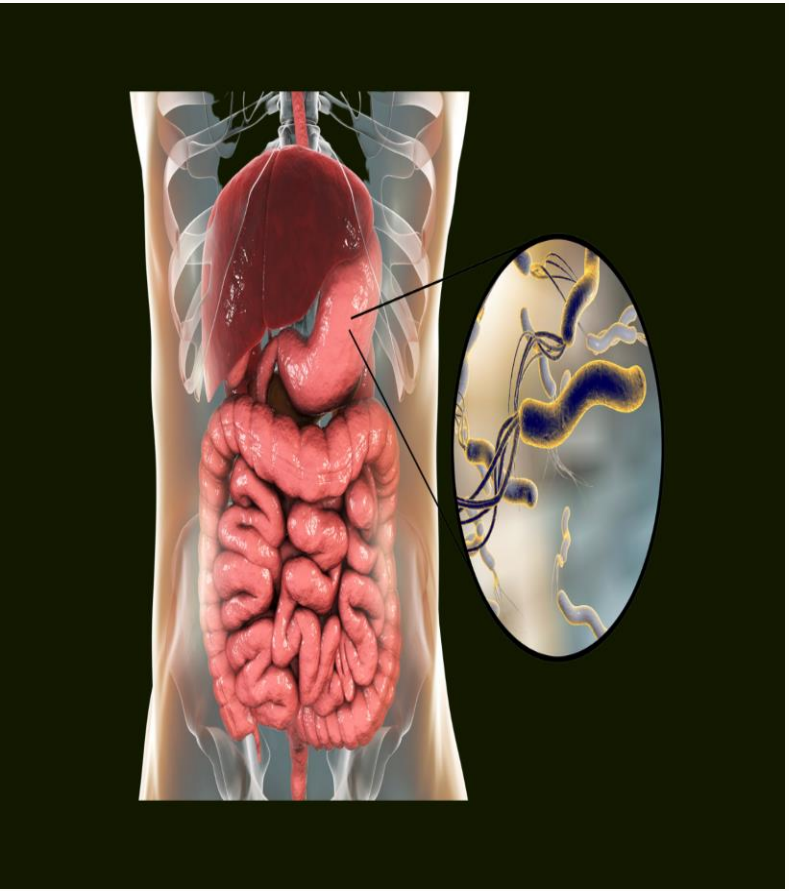
Positive Result = ≥ 20 ppm rise in hydrogen over baseline within 90 minutes.

Methane (CH_4)

Also produced during fermentation. Associated with conditions like obesity, IBS, and constipation.

Positive Result = Peak methane level ≥ 10 ppm at any point during the test

Gas present in the Small Intestine is indicative of Bacterial Overgrowth.



The Role of Lactulose in SIBO Testing

1. **Ingestion**

   Patient consumes 10 gm. of non-absorbable lactulose

2. **Fermentation**

   Bacteria in small intestine ferment lactulose.

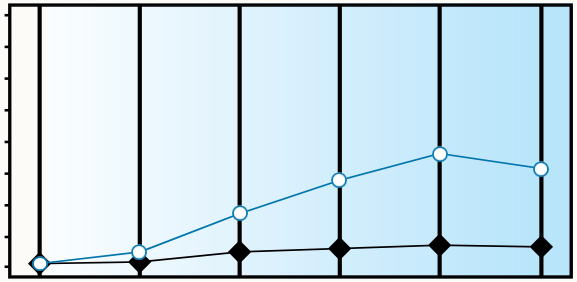
3. **Gas Production**

   Fermentation produces hydrogen and methane gases.

4. **Measurement**

   Gases are measured in breath tests.

Hydrogen (H2) and Methane Gases (CH4) Breath Gases



Interpreting Hydrogen Levels

1. **Positive Result**
   ≥ 20 ppm rise in hydrogen over baseline within 90 minutes.
2. ***Delayed Rise***
   Increase after 90 minutes may indicate slow transit or constipation.
3. **False Negative**
   Low levels may be due to hydrogen sulfide-producing bacteria.

Interpreting Methane Levels

1. ***Positive Result***
   Peak methane level ≥ 10 ppm
2. ***Clinical Considerations***
   Linked to obesity, IBS, Constipation.
3. ***Gastric Emptying Time***
   Slows intestinal transit

Quality Assurance: Carbon Dioxide Measurement

Purpose

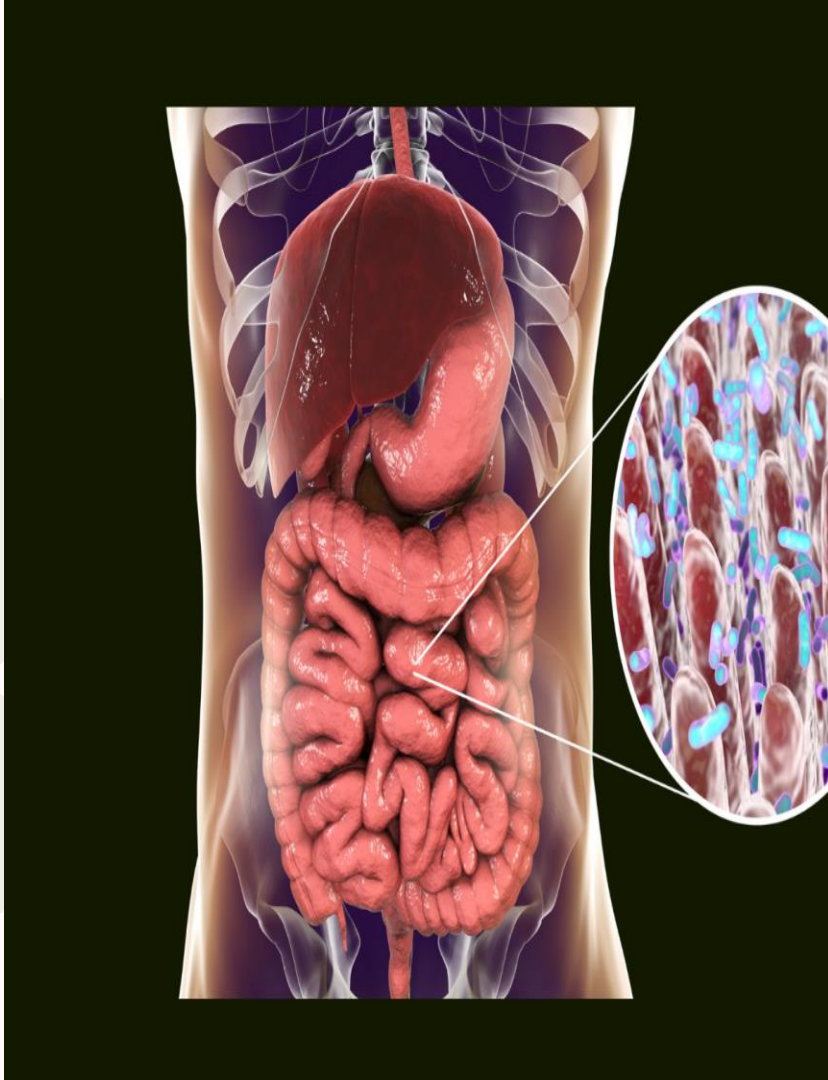
CO_2 measurement serves as a quality check for sample integrity.

High CO_2 Levels

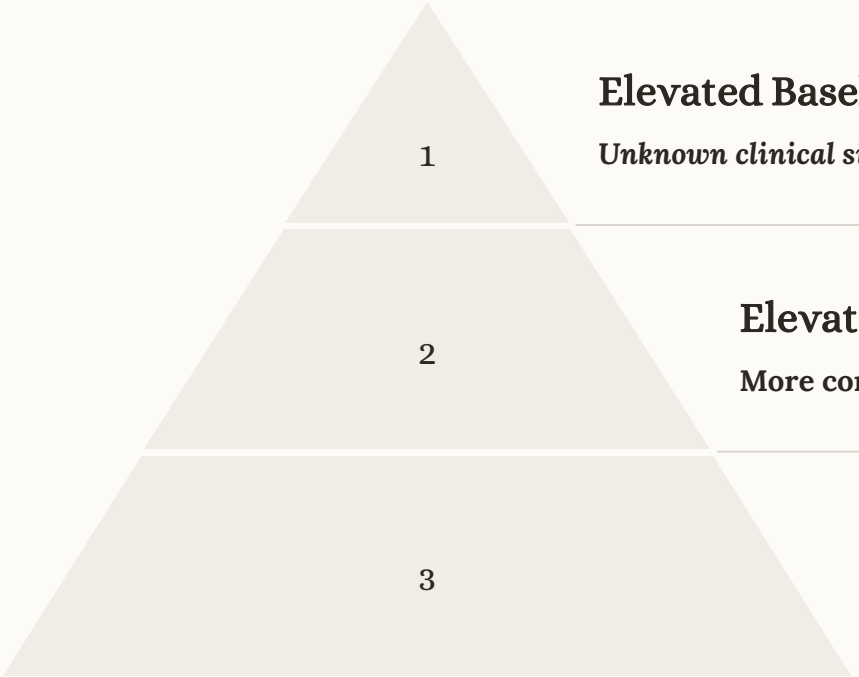
Indicate potential room air contamination of the sample.

Result Impact

High CO_2 leads to questionable sample integrity and non-reportable results.



Interpreting Baseline Levels



Elevated Baseline H_2

Unknown clinical significance, consider with symptoms.

Elevated Baseline CH_4

More common, methanogens can ferment without substrate.

Clinical Context

Interpret results in conjunction with patient symptoms.

SIBO Remedies (39)

RX: + *Hydrogen: Rifaximin 1200 mg/d x 14 Day*
+ *Methane: Rifaximin 1600 mg/d x 10 days +Metronidazole 750 mg/d x 10 days*

OTC Remedies

- **Caprylic Acid 1-2 gm 2 times a day**
- **Oil of Oregano 150 mg 2 po 3 times a day**
- **+ Methane Aged Garlic Extract 1-2 times a day**
- **Peppermint Tea 2 bags (140 mg) in 1 cup of water daily**
- **Grapefruit Seed Extract 500 mg 2x/d**
- **Probiotics-Lactobacillus Casei and L. acidophilus strains treat diarrhea in SIBO patients**
- **Low FODMAP Diet or Specific Carbohydrate Diet (SCD)**

Mucosal Barrier Assessment (40-41)

Zonulin

Regulates intestinal permeability.

High levels = Leaky gut

Activated by Gliadin

DAO

Diamine oxidase enzyme

Degrades histamine.

Vitamin B6, Vitamin C, Copper alters DAO

Histamine

Involved in immune responses.

High levels causes headache, diarrhea, migraine, circles under eyes, rhinitis, allergic s/s.

Lipopolysaccharides

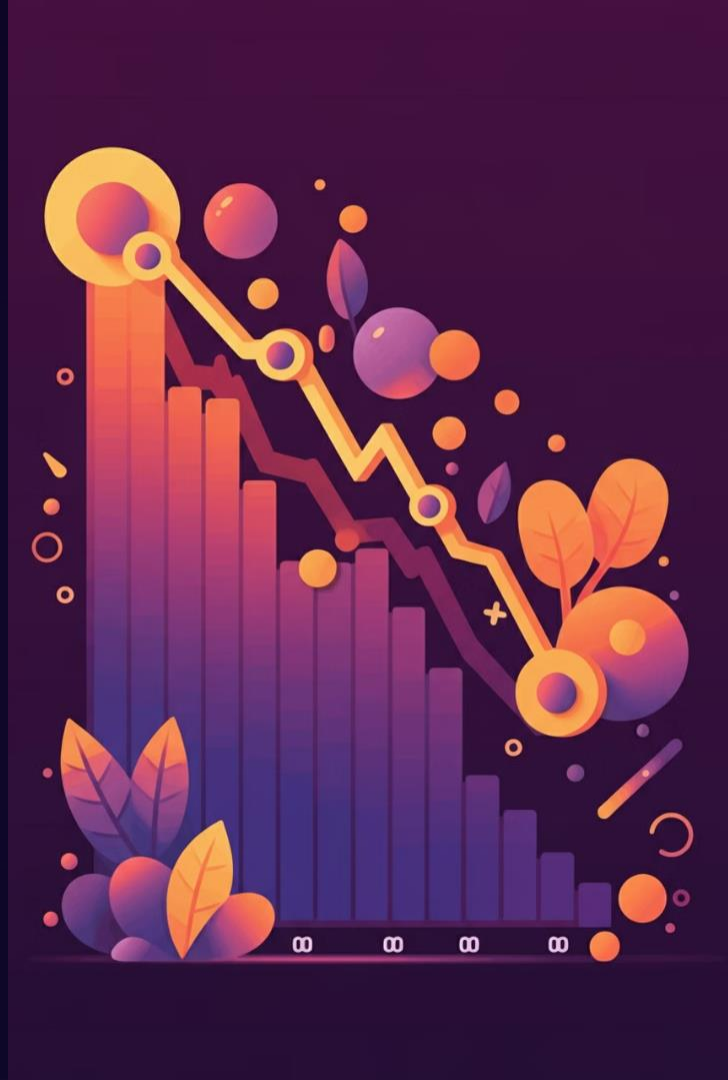
Endotoxins produced by gram-negative bacteria.

High levels = neuroinflammation.

Low levels = Immune Deficiency

Understanding Low Marker Levels (42)

Zonulin	Low levels not clinically significant. Low <7.5 ng/ml, Borderline 7.6-10.6
DAO	Low = atrophied microvilli & permeability Low = ongoing damage, cell dysfunction Low <34 ng/ml
Histamine	Low = fatigue and depression. Low <1.2 ng/ml (Low is Normal)



Interpreting High Marker Levels (43-46)

1

High Zonulin

Indicates possible bacteria, yeast, or gluten issues.

Remove wheat/gluten and treat dysbiosis.

High > 10.6 ng/ml

2

High DAO

Compensatory response to high histamine.

RX: Lower histamine levels.

Normal > 34.0 ng/ml

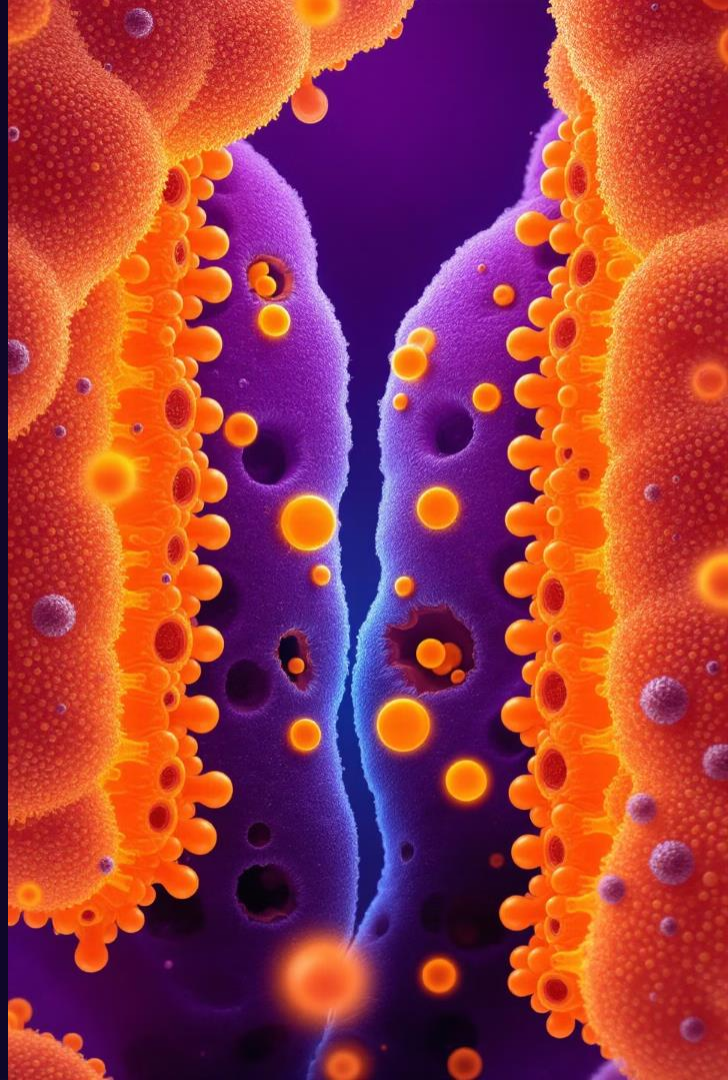
3

High Histamine

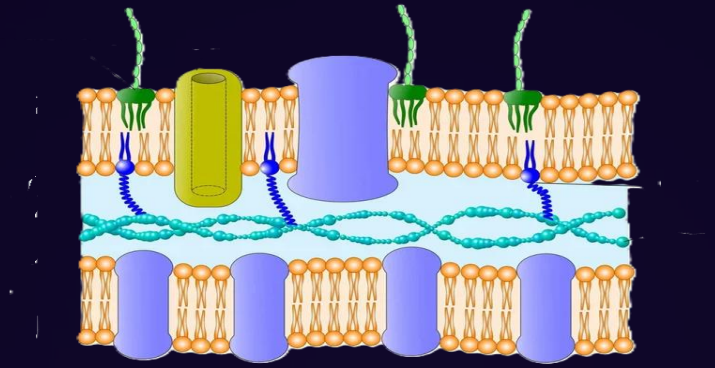
Caused by antigens triggering mast cell degranulation.

RX: DAO Enzymes, Mast Cell Stabilizers SAMe, and B5.

High > 2.1 ng/ml



Lipopolysaccharide Antibodies and Gut Health (44)



Low LPS Antibodies

Indicate a worn-down immune system.

Results from chronic infections.

Normal <0.2 ng/ml

RX: Immunoglobulins and Vitamins A and D.

High LPS Antibodies

Active immune response against bacterial overload.

RX: Antimicrobials

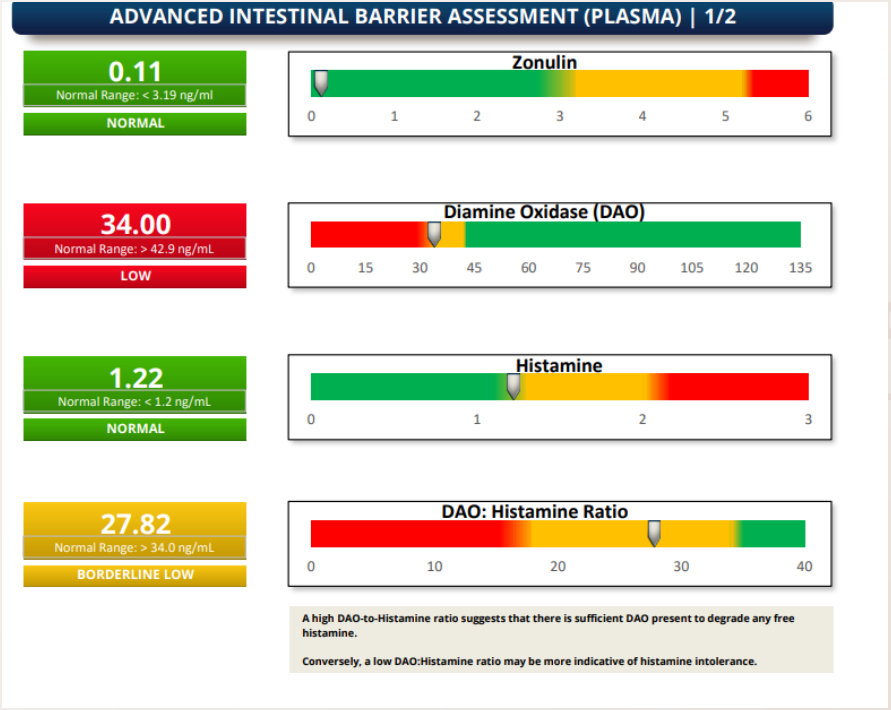
Moderate = Stress, High Fat Meal, Heat 1-2 ng/ml

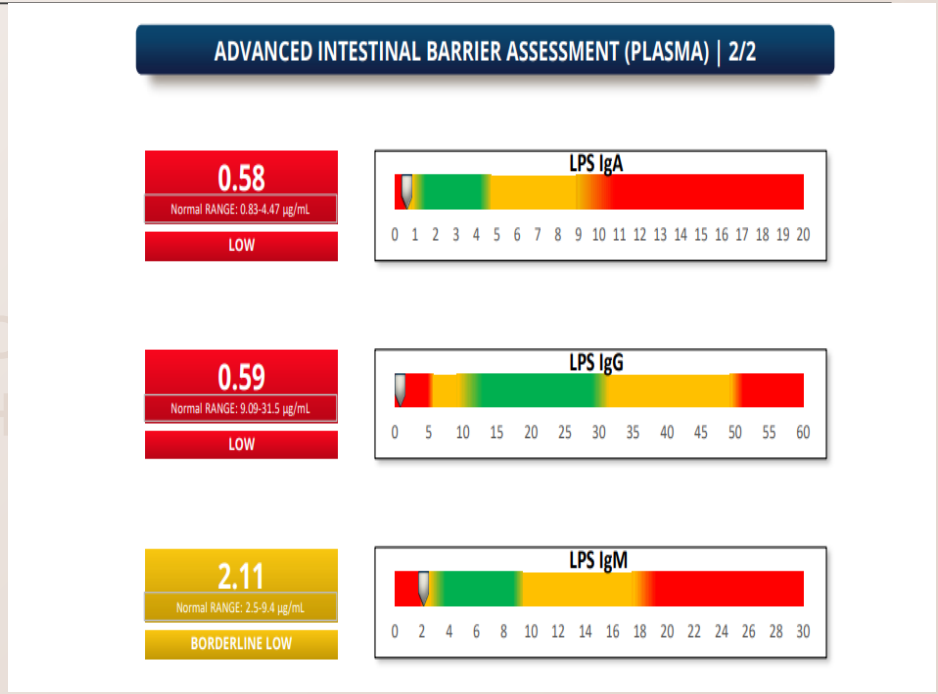
High = Intestinal Permeability 2-10 ng/ml

OTC Antimicrobials: Berberine, Oregano, Garlic.

Mucosal Barrier (45)

Read It Here First! *Stateline, Nevada* *January, 2025*





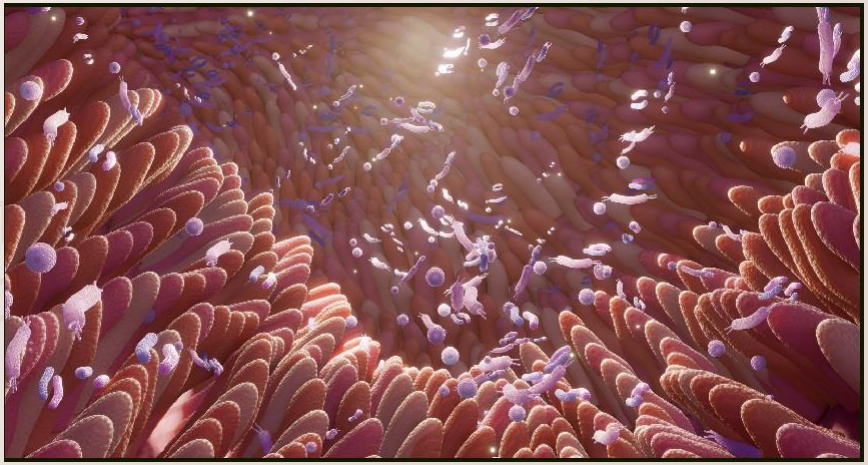
Mucosal Barrier Testing [40-46]	Normal Values	Optimal Value	Abnormal Value (High/Low)	Meaning of Abnormal Test
Zonulin	<100 ng/mL	20–50 ng/mL	High (>100 ng/mL)	Increased intestinal permeability ("leaky gut"), linked to inflammation, dysbiosis, or autoimmunity.
			Low (<10 ng/mL)	Rare; may not have clinical significance. Low zonulin may indicate optimal gut barrier integrity.
Diamine Oxidase (DAO)	>10 U/mL	15–40 U/mL	Low (<10 U/mL)	Histamine intolerance, poor DAO enzyme activity, or gut mucosal damage.
			High (>40 U/mL)	Rare but could indicate excessive supplementation or compensatory overproduction.

Mucosal Barrier Testing [40-46]	Normal Values	Optimal Value	Abnormal Value (High/Low)	Meaning of Abnormal Test
Histamine	<10 nmol/L	3–6 nmol/L	High (>10 nmol/L)	Reflects excessive histamine release due to food sensitivities, mast cell activation, or poor breakdown.
			Low (<3 nmol/L)	Rare; could indicate deficiency in histamine production, possibly related to overuse of antihistamines.
DAO:Histamine Ratio	>10	>20	Low (<10)	Histamine overload vs DAO activity.Seen in histamine overload and gut inflammation
Lipopolysaccharides (LPS)	IgA, IgG, IgM: <20 each	IgA, IgG, IgM: 5–15 each	High (>20 each)	Reflects immune response to endotoxins from gram-negative bacteria, indicating dysbiosis or increased gut permeability.
			Low (<5 each)	Weak immune response or impaired GALT

⁎ Mucosal Barrier Indications ⁎

Read It Here First! *Stateline, Nevada* *January, 2025*

- ***Autoimmunity***
- ***Food Sensitivities***
- ***Digestive Symptoms***
- ***Headache***
- ***Arrhythmias***
- ***Cardiovascular disease***
- ***Depression***
- ***Anxiety***
- ***Any condition in which a leaky gut is suspected to be the cause***



Metabolic Wellness Profile (47)

Markers for

1. (Protein) Digestion

i. Urinary Indican

Normal 0-81 ug/mg; Optimal 58-81ug/mg

1. Detoxification

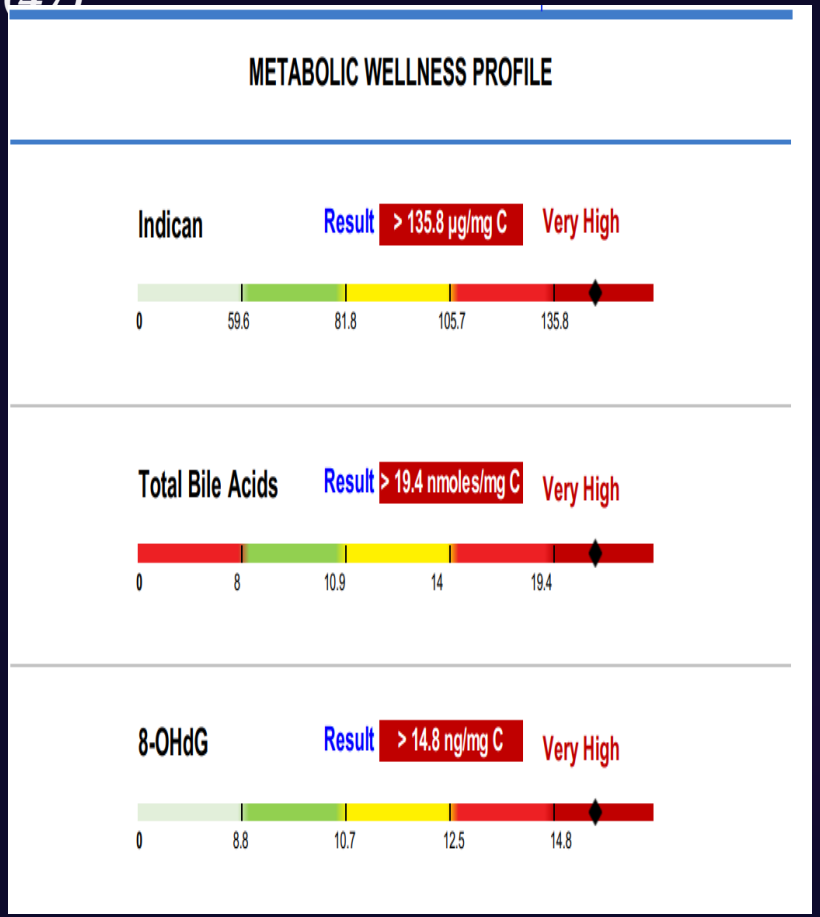
i. Urinary Bile Acids

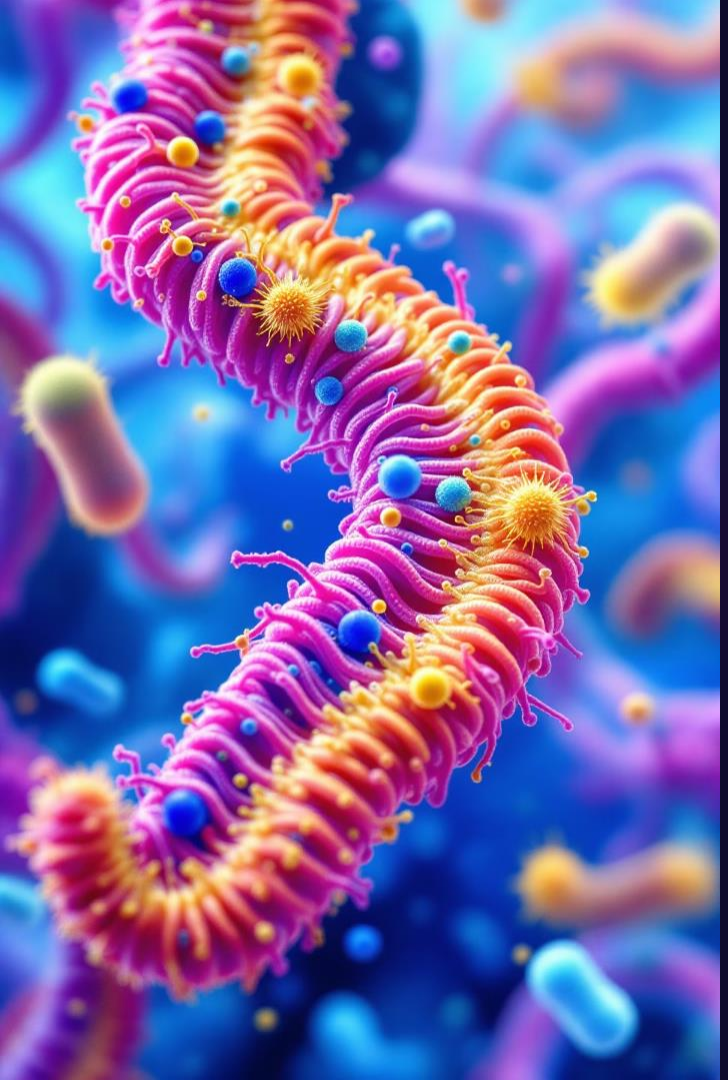
Normal 0-10 nmol/mg; Optimal 8-10 ng/mg

1. Oxidative Stress

8-Hydroxy-2-Deoxyguanosine (8-OHdG)

Normal 0-5.2 ng/mg; Optimal 0.5-2.0 ng/mg





Urinary Indican: Small Intestine Health (48)

Dysbiosis Indicator

SIBO, Leaky Gut,

Malabsorption

Poor protein digestion

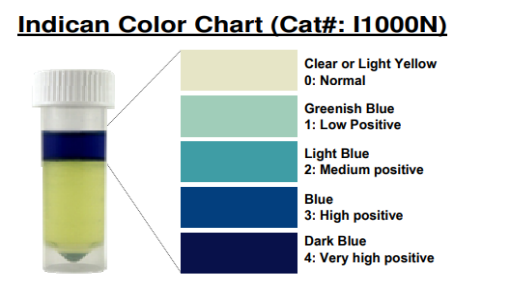
Screening Tool

Dysbiotic fermentation of dietary tryptophan in the small intestine.

Symptoms Associated with Indican Abnormalities

Maldigestion, *Protein malabsorption, adverse glycemic control, Hormone and fluid balance. Gas, Bloating, Diarrhea, Malabsorption, Intestinal obstruction, Parasitic or fungal infections like Candida, Liver Dysfunction, Nutritional deficiencies*

Urinary Indican Details



- **Low or High Levels:**
  - ***Inadequate dietary protein digestion.***
  - ***Intestinal toxemia.***
  - ***Putrefaction of undigested food***
  - ***Various stomach disorders,***
    - ***Insufficient HCl***
    - ***Pancreatic insufficiency***
      - ***Trypsin and chymotrypsin***

High to Very High Levels: Inability to Digest Protein =

- **Greater HCl Insufficiency:**
  - **Hypochlorhydria.**
  - **Protease enzyme deficiency.**
- **Other:**
  - **Hypomotility of the SI**
  - **Liver dysfunction.**
  - **Increases in:**
    - ***Salmonella*.**
    - ***Staph. aureus*.**
    - ***Candida albicans* and other *Candida* species.**

Adverse effects on:

- **Glycemic control**
- **Hormone balance**

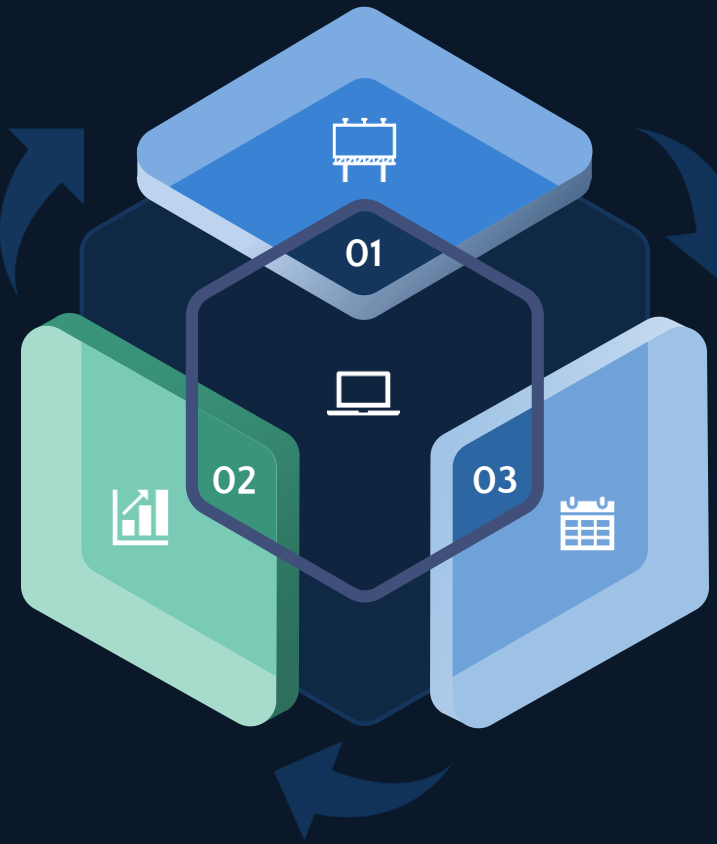
Urinary Total Bile Acids (49)

Elevated Total Bile Acids

Bile acids not removed by the liver.

Screening for:

- Liver dysfunction.
- Viral disease Risk
- Cirrhosis.
- Drug-induced liver injury.
- Cholestasis.



Role of Bile Acids

Cholesterol elimination.
Fat absorption.
Regulates energy expenditure.
Glucose and lipid metabolism.

Low Total Bile Acids

Inflammatory bowel disease (IBD)

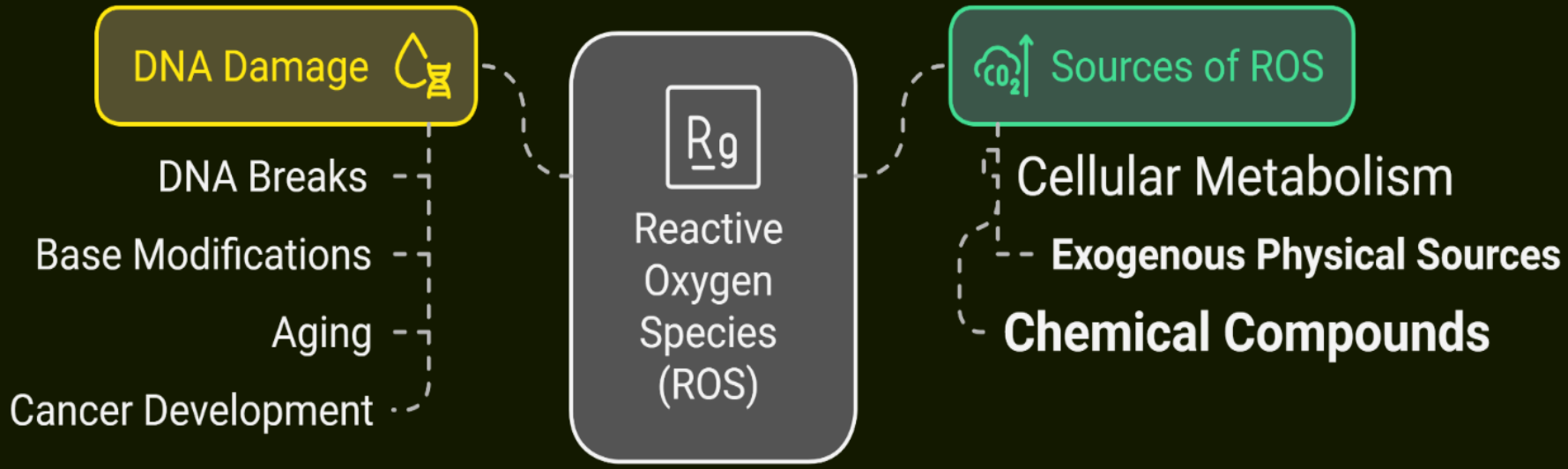
Chronic malabsorption.

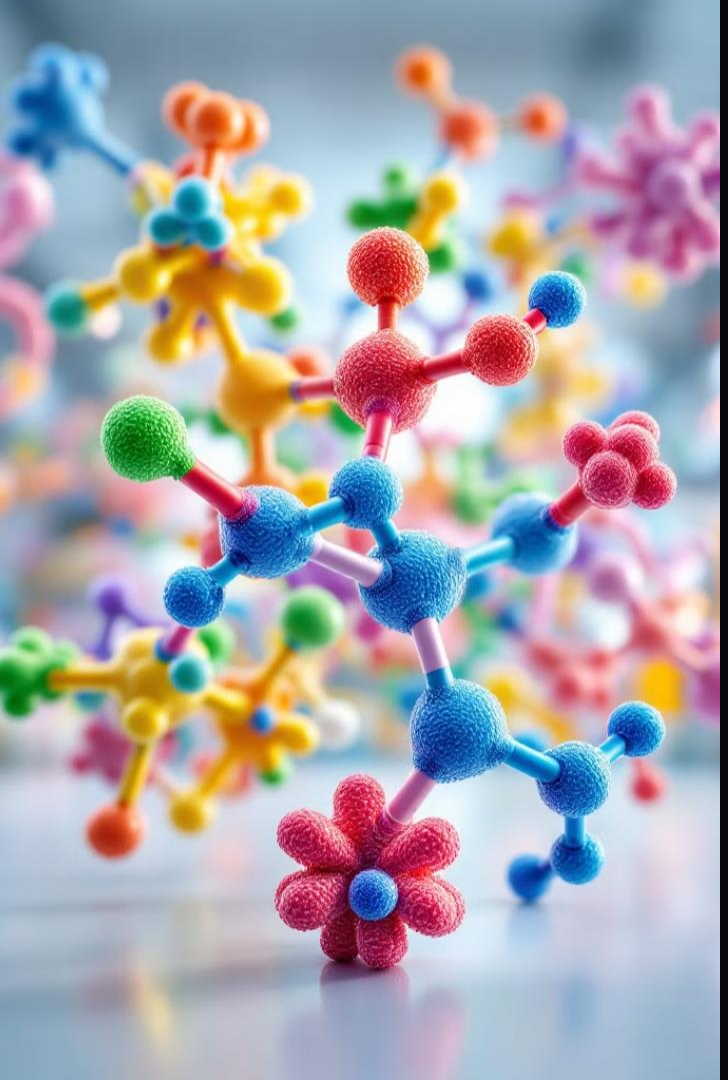
Persistent diarrhea.

Starvation.

Urinary 8-Hydroxy-2-Deoxyguanosine (8-OHdG) [50]

A Biomarker for Reactive Oxidative Stress (DNA Damage)





Understanding 8-OHdG: Formation and Significance

Oxidized Derivative

8-OHdG is an oxidized form of deoxyguanosine, a crucial component of DNA. Its formation occurs when reactive oxygen species (ROS) attack the DNA molecule, particularly at guanine nucleotides.

DNA Oxidation Product

As a significant product of DNA oxidation, 8-OHdG is commonly observed in both nuclear and mitochondrial DNA. This makes it an excellent indicator of overall cellular oxidative stress.

Mutation Induction

The presence of 8-OHdG in replicating DNA is associated with mutation induction. This relationship underscores its potential role in various pathological processes, including carcinogenesis.

Biomarker

Due to its formation mechanism and prevalence, 8-OHdG is considered a **biomarker for oxidative DNA damage.**

Clinical Relevance of 8-OHdG

Human Cancers

Elevated 8-OHdG Levels:

Lung

Breast

Colorectal cancers

Degenerative Diseases

Elevated 8-OHdG Levels:

Neurodegenerative Disorders:

Alzheimer's and Parkinson's Dx.

Increased 8-OHdG levels imply a role for oxidative DNA damage in their genesis.

Health Conditions Associated with 8-OHdG

Metabolic Disorders

Diabetes and Obesity

Respiratory Diseases

COPD and cystic fibrosis

Neurological Conditions

Parkinson's and Alzheimer's Dx

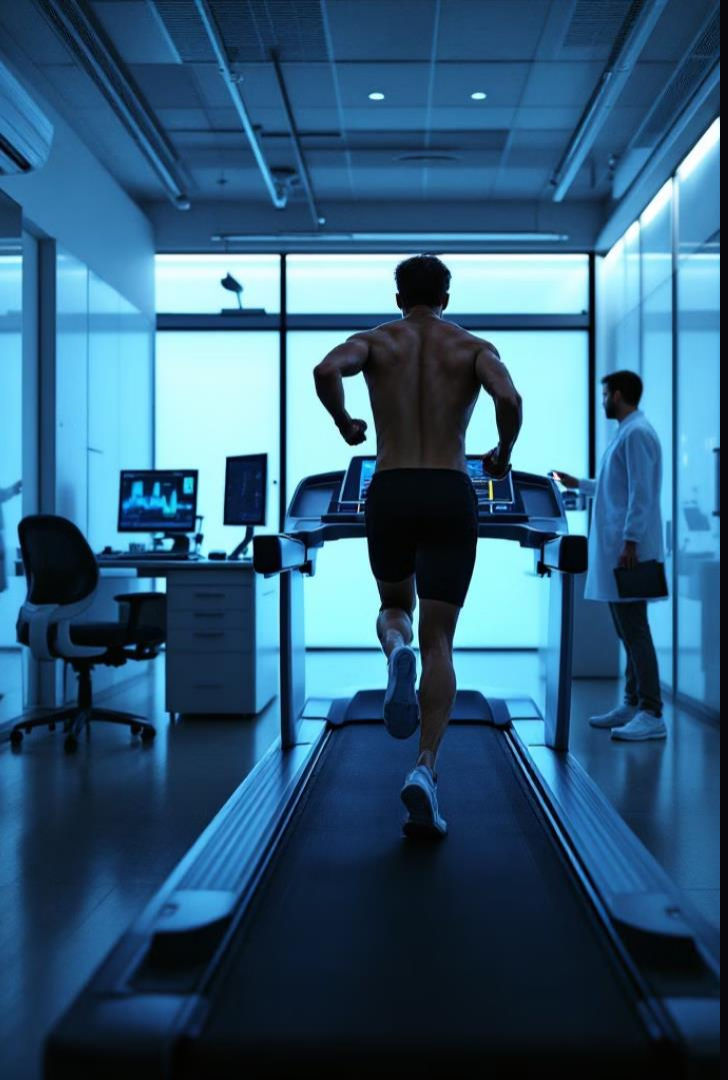
Inflammatory Conditions

Rheumatoid arthritis

Chronic hepatitis

Pancreatitis

The formation of 8-OHdG serves as a measurable endpoint of this oxidative cascade.



Exercise-induced Oxidative Damage and 8-OHdG

1

Pre-Exercise

Baseline 8-OHdG levels are collected before the exercise regimen begins.

2

During Exercise

Extensive exercise tends to increase 8-OHdG levels = acute oxidative stress

3

Post-Exercise

8-OHdG levels are monitored in the recovery phase

Assesses the body's ability to manage exercise-induced oxidative damage.

4

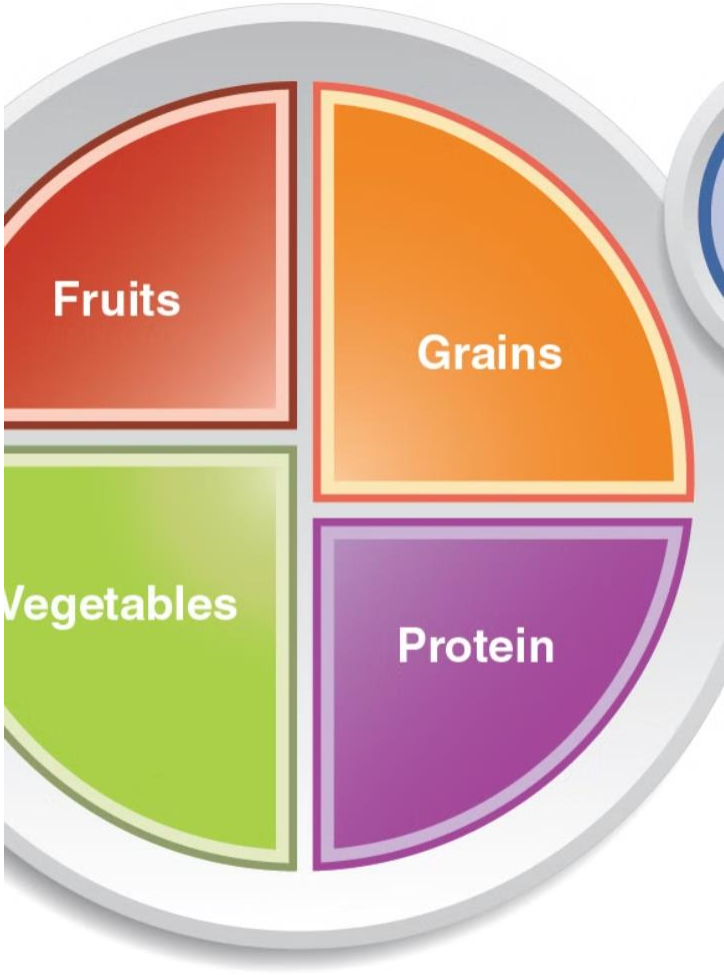
Long-term Adaptation

Regular exercise leads to improved antioxidant defenses

Lowers baseline 8-OHdG levels over time.

Metabolic Wellness Summary [47-50]	Normal Values	Optimal Value	Abnormal Value (High/Low)	Meaning of Abnormal Test
Indican (urine)	0–1.0 mg/dL	<0.5 mg/dL	**High (>1.0 mg/dL)**	Indicates protein putrefaction due to dysbiosis or poor digestion. Common in malabsorption or gut bacterial imbalance.
			Low (<0.1 mg/dL)	Rare; typically not clinically significant but may suggest low protein intake.
Urinary Bile Acids (UBA)	<10 mg/dL	<5 mg/dL	**High (>10 mg/dL)**	Suggests liver dysfunction, bile acid malabsorption, or cholestasis. Indicates compromised fat metabolism or gallbladder stress.
			Low (<2 mg/dL)	Indicates insufficient bile acid production or low-fat diet; rarely measured in this context.
8-Hydroxy-2-Deoxyguanosine (8-OHdG)	<10 ng/mg creatinine	2–5 ng/mg creatinine	**High (>10 ng/mg creatinine)**	Reflects increased oxidative DNA damage, linked to high oxidative stress or environmental toxin exposure. Associated with aging, cancer risk, or chronic inflammation.
			Low (<1 ng/mg creatinine)	Rare; not typically concerning but could indicate a low oxidative stress burden.

Food Sensitivity Testing:



The Importance of Food Sensitivity Testing (51)

Chronic Disease Burden

Chronic diseases account for 7 of 10 deaths yearly and 86% of healthcare costs. Poor diet contributes significantly to these issues.

Prevalence of IBS

Irritable Bowel Syndrome affects 10-15% of the global population, with an estimated 1.1 billion cases worldwide.

Need for Dietary Guidance

Food sensitivity testing can help individuals understand which foods might be causing adverse reactions and develop a more personalized dietary approach.

Criticisms and Limitations

Food Sensitivity ≠ Allergies

Individual Variation

Food reactions are unique to each person, meaning one person's trigger food may not affect another.

Scientific Basis

Critics argue that food sensitivity tests lack a robust scientific foundation and reproducibility.

False Positives

There's a risk of false positives, potentially leading to unnecessary dietary restrictions.

The Evidence Supporting Food Sensitivity Testing

1

IgG Antibodies and Food Intolerance

Studies suggest a possible link between food-specific IgG antibodies and food intolerance or allergy symptoms.

Females are more sensitive to IgG antibodies than males

2

Migraine Reduction

Research shows that reducing foods based on IgG antibody detection may lessen the frequency of migraine attacks.

3

Weight Management & Quality of Life

Studies demonstrate that implementing an IgG-mediated food elimination diet leads to weight loss and improvements in mental and physical quality of life.

The Evidence: (52)

IBS and Food Sensitivity

IBS improved using IgG sensitivities. Reductions in plasma elastase)which causes tissue damage and disrupts tight junctions).

IBD and Food Sensitivity

High prevalence of serum IgG antibodies to specific food allergens in patients with IBD.

Patient Centered

Testing is beneficial for those with digestive issues, skin problems, and cognitive symptoms.

Concentration

Food elimination based on IgG Sensitivity improves listening, concentration, information processing and memory

Testing Methodologies (53)

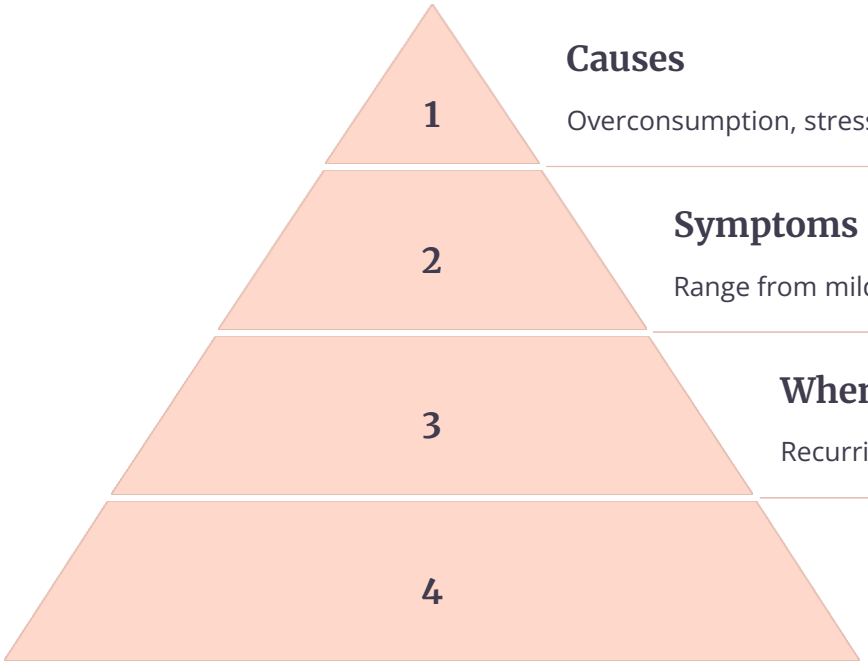
ELISA vs. Microarray

Both measure IgG reactivity but differ in methodology. ELISA measures light passed through, while microarray measures reflected light. Microarrays are considered more precise and efficient.

IgG Cellular Response Test

Assesses the cellular response of whole blood to foods and other substances, identifying triggers in the innate immune system. It has shown improvements in various health conditions and can identify foods associated with cfDNA and NETs.

General Food Sensitivity Information [54]



Causes

Overconsumption, stress, infections, increased intestinal permeability

Symptoms

Range from mild bloating to severe behavioral problems

When to Test

Recurring symptoms like headaches, digestive issues, skin disorders

Prevalence

100 million people suspect food allergy or have modified diet

Key Takeaways

1

Potential Benefits

Food sensitivity testing identifies trigger foods

2

Limitations

Critics argue about reproducibility.

3

Personalized Approach

Food reactions are unique to individuals

Allows for personalized dietary guidance.

Food Sensitivity Panel

PATIENT INFORMATION
Sample Patient
DOB: 00/00/0000
REQUISITION ID: 0000000

PROVIDER INFORMATION
Sample Provider
Street Address
City, State 00000

184 IgG Food Panel

SPECIMEN TYPE:

COLLECTION DATE: 00/00/0000

REPORT DATE: 00/00/0000

TEST	SCORE	CLASS	TEST
MEAT & POULTRY			
Beef	0.154	0	
Buffalo	0.159	0	
Chicken	0.194	0	
Duck	0.163	0	
Lamb	0.161	0	
Pork	0.160	0	
Turkey	0.195	0	
Venison	0.179	0	
FISH & SHELLFISH			
Anchovy	0.179	0	
Bass	0.190	0	
Clam	0.179	0	
Codfish	0.176	0	
Crab	**0.233**	**1**	
Flounder	0.166	0	
Haddock	**0.227**	**1**	
Halibut	0.169	0	
Herring	0.189	0	
Lobster	0.193	0	
Mackerel	0.173	0	
Mussel	0.171	0	
Oyster	**0.226**	**1**	
Perch	**0.241**	**1**	
Red Snapper	0.175	0	
Salmon	0.198	0	
Scallop	0.174	0	
Shrimp	0.169	0	
Sole	0.173	0	
Squid	**0.242**	**1**	
Swordfish	0.178	0	
Trout	0.188	0	
Tuna	0.159	0	
Walleye Pike	0.190	0	
GRAINS & STARCHES			
Amaranth	**0.210**	**1**	
Arrowroot	**0.243**	**1**	
Barley Bran	0.164	0	
Buckwheat	0.168	0	
Corn	0.191	0	
Gluten	0.160	0	
Hops	0.176	0	
Malt	**0.222**	**1**	
	0.165	0	
Millet	0.196	0	
Oats	0.174	0	
Quinoa	0.193	0	
Rice	0.184	0	
Rye	0.186	0	
Sorghum	0.178	0	
Tapioca	0.170	0	
Teff	0.176	0	
Wheat	0.190	0	

SCORE	CLASS	TEST	SCORE	CLASS	TEST	SCORE	CLASS
DAIRY & EGG			**NUTS, SEEDS & OILS**				
Artichoke	**0.225**	**1**	**Blue Cheese**	**0.241**	**1**	Almond	0.157	0
Asparagus	0.173	0	Casein	0.190	0	Brazil Nut	0.190	0
Beans	0.163	0	Cheddar Cheese	0.169	0	Canola	0.162	0
Bell Pepper	0.154	0	**Egg White**	**0.217**	**1**	Cashew	0.171	0
Broccoli	0.154	0	**Egg Yolk**	**0.241**	**1**	**Chestnut**	**0.237**	**1**
Brussel Sprouts	0.169	0	Milk, Cow's	0.166	0	**Chia Seed**	**0.241**	**1**
Cabbage	0.155	0	Milk, Goat's	0.172	0	Cola	0.186	0
Carrot	0.178	0	Milk, Sheep's	0.188	0	Flaxseed	0.161	0
Cauliflower	0.169	0	**Mozzarella Cheese**	**.210**	**1**	Hazelnut	0.175	0
Celery	0.159	0	Swiss Cheese	176	0	Hemp	0.195	0
Cucumber	0.159	0	**Whey Yogurt**	**.238**	**1**	Macadamia Nut	0.166	0
Eggplant	0.157	0		176	0	Pecan	0.160	0
Garlic	0.180	0	**FRUITS**			Pine Nut	0.196	0
Green Bean	0.190	0	**Apple**			Pistachio	0.183	0
Kale	0.167	0	Apricot	177	0	Poppy Seed	0.178	0
Kelp	**0.208**	**1**	**Avocado**	166	0	Safflower	0.190	0
Lettuce	0.169	0	Banana	**.234**	**1**	Sesame	0.192	0
Mushroom	0.196	0	Blackberry	176	0	Sunflower Seed	0.188	0
Okra	0.183	0	Blueberry	188	0	Walnut	0.181	0
Olive, Green	0.173	0	Cantaloupe	156	0	**HERBS, SPICES, FLAVORINGS**		
Onion Parsnip	0.170	0	Cherry	160	0	**Basil**	**0.235**	**1**
Potato Potato	0.159	0	Coconut	159	0	**Black Pepper**	**0.217**	**1**
Sweet	0.182	0	**Cranberry**	176	0	**Cilantro/Coriander**	**0.237**	**1**
Pumpkin	0.193	0	Date	**.233**	**1**	Cinnamon	0.166	0
Radish	0.175	0	**Fig**	177	0	**Cloves**	**0.236**	**1**
Spinach	**0.235**	**1**	Grape	**.228**	**1**	Dill	0.173	0
Squash	**0.235**	**1**	Grapefruit	181	0	Fennel Seed	0.175	0
Tomato Turnip	0.156	0	Honeydew	157	0	Ginger	0.164	0
Zucchini	0.160	0	**Kiwi**	176	0	Ginseng	0.165	0
	0.198	0	Lemon	**.233**	**1**	Horseradish	0.165	0
	0.171	0	Lime	177	0	Licorice	0.188	0
LEGUMES & PULSES				175	0	Mustard	0.183	0
Black Bean	0.174	0	**Mango**	**.202**	**1**	Nutmeg	0.165	0
Black-eyed Peas	0.170	0	Orange	168	0	**Oregano**	**0.235**	**1**
Chickpea	0.164	0	Papaya	175	0	**Paprika**	**0.221**	**1**
Green Pea	0.177	0	Peach Pear	0.150	0	Parsley	0.165	0
Kidney Bean	**0.229**	**1**	Pineapple	0.174	0	Peppermint	0.198	0
Lentil Lima	0.185	0	Plum	0.155	0	Rosemary	0.193	0
Bean Navy	0.152	0	Raspberry	0.166	0	Sage	0.197	0
Bean	0.187	0	Rhubarb	0.158	0	Tarragon	0.172	0
Peanut	**0.223**	**1**	Strawberry	0.161	0	**Thyme**	**0.235**	**1**
Pinto Bean	0.194	0	Tangerine	0.162	0	**Turmeric**	**0.237**	**1**
Soybean	0.180	0	Watermelon	0.190	0	Vanilla Bean	0.186	0
			BEVERAGES & MISC				
			Black Tea	0.191	0		
			Carob	0.190	0		
			Cocoa	0.174	0		
			Coffee	0.183	0		
			Green Tea	0.195	0		
			Honey	0.191	0		
					1		
					1		

Reference Range

<= 0.199 = CLASS 0	0.200 - 0.299 = CLASS 1	0.300 - 0.399 = CLASS 2	>= 0.400 = CLASS 3
No Sensitivity Detected	Low Sensitivity Detected	Moderate Sensitivity Detected	High Sensitivity Detected

Food Sensitivity Panel (55)

184 IgG Food Panel

>= 0.400 = CLASS 3
HIGH SENSITIVITY DETECTED None Detected

0.300 - 0.399 = CLASS 2 MODERATE SENSITIVITY
DETECTED No Items Detected

0.200 - 0.299 = CLASS 1 LOW SENSITIVITY
DETECTED

Avocado	Basil	Black Pepper	Blue Cheese	Chestnut
Chia Seed	Cilantro/Coriander	Cloves	Crab Haddock	Cranberry
Egg, White	Egg, Yolk	Fig Kiwi	Mango Peanut	Mozzarella Cheese
Oregano	Kidney Bean	Paprika	Thyme	Hops
Kelp	Oyster Spinach	Squid		Perch
Radish	Yeast, Baker's	Yeast, Brewer's		Turmeric
Whey				

Reference Range

<= 0.199 = CLASS 0 No Sensitivity Detected	0.200 - 0.299 = CLASS 1 Low Sensitivity Detected	0.300 - 0.399 = CLASS 2 Moderate Sensitivity Detected	>= 0.400 = CLASS 3 High Sensitivity Detected

The test results should be correlated with clinical findings.

Food Sensitivity Panel

REPORT DATE: 00/00/0000

	ALLERGEN (IgE)	SCORE	CLASS
	Almond	<0.10	0
	Apple	1.58	2
	Beef	<0.10	0
	Cashew	<0.10	0
M	Corn	<0.10	0
	Egg	<0.10	0
	Milk (Cow's)	<0.10	0
S	Orange	<0.10	0
	Peanut	77.58	5
	Salmon	<0.10	0
	Sesame Seed	<0.10	0
	shrimp	<0.10	0
	Soybean	15.98	3
	Strawberry	<0.10	0
	Wheat	<0.10	0

IgE Ranges kUA/l

< 0.10 = 0
0.35 – 0.69 = 1
0.70 – 3.49 = 2
17.50 – 49.99 = 4
> 100 = 6

Ranges are reflective of increasing concentrations of allergen specific IgE.

- In the interpretation of some food allergen test results, cross reactivity with other homologous food and/or environmental allergens can occur. The test findings should be interpreted in the context of the clinical findings and the individual's health history.

- Diagnostic features of an IgE-mediated allergy include sensitization to a specific allergen and an individual 's clinical history of allergic symptoms on exposure to that allergen. A negative immunoassay laboratory test result especially in an individual with a strongly suggestive clinical and symptomatic history does not rule out allergy and further evaluation.

Testing for Heavy Metals, Environmental Toxins, and Mold

Environmental toxin exposure can have significant impacts on health. This presentation will explore the signs, testing methods, and treatment strategies for addressing environmental toxin exposure.

Environmental Exposure Symptom List [56]

Acute Symptoms

- Nasal stuffiness, congestion, Sneezing
- Sinus pressure
- Eye irritation (burning, watery, or reddened)
- Sore throat
- Coughing or wheezing
- Skin irritation or rash
- Shortness of breath

Chronic Symptoms

- Allergic reactions, Persistent cough
- Worsening of asthma symptoms
- Fatigue
- Headache
- Difficulty concentrating ("brain fog")
- Nausea/Vomiting/Diarrhea
- Dizziness or lightheadedness
- Memory problems
- Mood changes-Irritability/depression

Environmental Exposure Symptom List [57]

Acute Symptoms

- Nausea and vomiting
- Abdominal pain
- Diarrhea
- Fever
- Dizziness
- Fatigue

Chronic Symptoms

- Weakened immune system
- Neurological eff headaches, memory loss, irritability
- Liver and kidney damage
- Wheezing, coughing
- Skin irritation and dermatitis
- Reproductive issues
- GI distress-diarrhea or constipation
- Cancers
- Organ system toxicity
- Developmental/growth issues
- Endocrine disruption
- Hormone imbalances

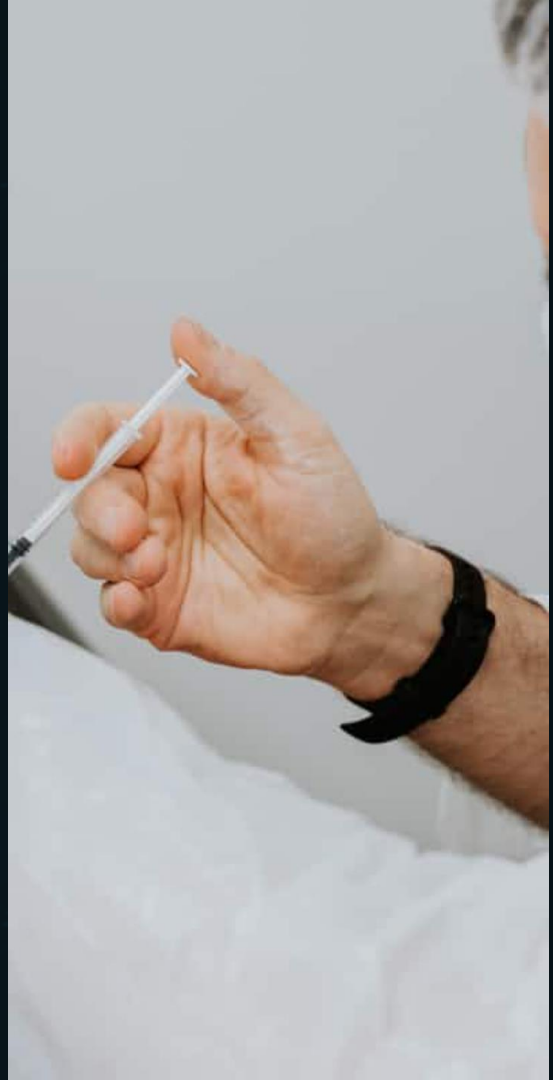
Environmental Toxin Testing

Hair Analysis for Heavy Metals

Urine for Heavy Metals

Environmental Toxins Assessment

Mold Toxicity



Main Signs and Symptoms of Environmental Toxin Exposure

- Neurodegeneration
- Immune overactivation
- Liver disease
- Hormone imbalances
- Oxidative stress

Heavy Metal Hair [58]

Toxic & Essential Elements; Hair

TOXIC METALS

		RESULT µg/g	REFERENCE INTERVAL
Aluminum	(Al)	1.5	< 7.0
Antimony	(Sb)	< 0.01	< 0.066
Arsenic	(As)	0.027	< 0.080
Barium	(Ba)	0.29	< 1.0
Beryllium	(Be)	< 0.01	< 0.020
Bismuth	(Bi)	< 0.002	< 2.0
Cadmium	(Cd)	0.021	< 0.065
Lead	(Pb)	0.82	< 0.80
Mercury	(Hg)	2.8	< 0.80
Platinum	(Pt)	< 0.003	< 0.005
Thallium	(Tl)	< 0.001	< 0.002
Thorium	(Th)	< 0.001	< 0.002
Uranium	(U)	0.036	< 0.060
Nickel	(Ni)	0.31	< 0.20
Silver	(Ag)	0.08	< 0.08
Tin	(Sn)	0.05	< 0.30
Titanium	(Ti)	0.21	< 0.60
Total Toxic Representation			

PERCENTILE: 68th, 95th

ESSENTIAL AND OTHER ELEMENTS

		RESULT µg/g	REFERENCE INTERVAL
Calcium	(Ca)	554	200 – 750
Magnesium	(Mg)	31	25 – 75
Sodium	(Na)	7	20 – 180
Potassium	(K)	3	9 – 80
Copper	(Cu)	64	11 – 30
Zinc	(Zn)	200	130 – 200
Manganese	(Mn)	0.14	0.08 – 0.50
Chromium	(Cr)	0.37	0.40 – 0.70
Vanadium	(V)	0.018	0.018 – 0.065
Molybdenum	(Mo)	0.010	0.025 – 0.060
Boron	(B)	0.82	0.40 – 3.0
Iodine	(I)	0.54	0.25 – 1.8
Lithium	(Li)	< 0.004	0.007 – 0.020
Phosphorus	(P)	126	150 – 220
Selenium	(Se)	0.75	0.70 – 1.2
Strontium	(Sr)	1.4	0.30 – 3.5
Sulfur	(S)	48100	44000 – 50000
Cobalt	(Co)	0.003	0.004 – 0.020
Iron	(Fe)	5.0	7.0 – 16
Germanium	(Ge)	0.033	0.030 – 0.040
Rubidium	(Rb)	< 0.003	0.011 – 0.12
Zirconium	(Zr)	0.035	0.020 – 0.44

PERCENTILE: 2.5th, 16th, 50th, 84th, 97.5th

SPECIMEN DATA

COMMENTS:

Date Collected: 05/16/2017
Date Received: 05/23/2017
Date Completed: 05/25/2017
Methodology: ICP/MS

Sample Size: 0.199 g
Sample Type: Head
Hair Color:
Treatment:
Shampoo:

RATIOS

ELEMENTS	RATIOS	RANGE
Ca/Mg	17.9	4 – 30
Ca/P	4.4	0.8 – 8
Na/K	2.33	0.5 – 10
Zn/Cu	3.13	4 – 20
Zn/Cd	> 999	> 800

Hair Elements Report - Levels and Associated Medical Conditions (59)

Element	Level	Medical Conditions from Excess/Deficiency
Lead (Pb)	High	Neurotoxicity, nephrotoxicity, anemia, cognitive dysfunction, hyperactivity in children.
Mercury (Hg)	High	Immune dysregulation, cognitive dysfunction, depression, neuromuscular disorders.
Nickel (Ni)	High	Dermatitis, chronic rhinitis, pulmonary inflammation, hypersensitivity reactions, liver necrosis.
Copper (Cu)	High	Depression, irritability, tremor, hemolytic anemia, behavioral disorders, liver disease.

Hair Elements Report - Levels and Associated Medical Conditions

Element	Level	Medical Conditions from Excess/Deficiency
Potassium (K)	Low	Muscle weakness, fatigue, tachycardia, gastrointestinal or renal dysfunction, diabetic acidosis.
Chromium (Cr)	Low	Hyperglycemia, diabetes-like symptoms, cardiovascular disease, atherogenic lipoprotein profile.
Molybdenum (Mo)	Low	Protein intolerance, sensitivity to sulfites and aldehydes, subnormal uric acid levels.
Lithium (Li)	Low	Behavioral/emotional disorders, neuronal excitability, potential mood stabilization benefits.
Phosphorus (P)	Low	Abnormal bone and teeth mineralization, disrupted energy metabolism, vitamin D metabolism issues.
Rubidium (Rb)	Low	No known biological function; minimal health implications at low levels.

Heavy Metal Urine [61]

Toxic Metals; urine

TOXIC METALS		RESULT µg/g Creat	REFERENCE INTERVAL	WITHIN REFERENCE / OUTSIDE REFERENCE
Aluminum	(Al)	1.6	< 15	
Antimony	(Sb)	0.074	< 0.18	
Arsenic	(As)	12	< 40	
Barium	(Ba)	0.88	< 5	
Beryllium	(Be)	<dl	< 0.10	
Bismuth	(Bi)	0.091	< 0.8	
Cadmium	(Cd)	0.35	< 0.6	
Cesium	(Cs)	11	< 9	
Gadolinium	(Gd)	<dl	< 0.5	
Lead	(Pb)	2.1	< 1.1	
Mercury	(Hg)	0.55	< 0.8	
Nickel	(Ni)	7.7	< 4	
Palladium	(Pd)	<dl	< 0.2	
Platinum	(Pt)	<dl	< 0.1	
Tellurium	(Te)	<dl	< 0.2	
Thallium	(Tl)	2.2	< 0.4	
Thorium	(Th)	<dl	< 0.007	
Tin	(Sn)	0.19	< 3	
Tungsten	(W)	<dl	< 0.4	
Uranium	(U)	<dl	< 0.03	

URINE CREATININE		RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine		32.5	35 – 240	

Strategies to Support Detoxification

1. **Foundational Detox Support**

Silymarin, NAC, and Indole-3-Carbinol

3. Ensure daily bowel movements

1-2 per day minimum

Consume fiber from fruits and vegetables

I5. increase green leafy vegetables

To increase phytonutrients and antioxidant levels

Reduce exposure to chemicals

Through processed food, air pollution, and tap water

2. Use HEPA air filters

To remove up to 98% of dust, pollen, mold, bacteria and airborne particles

4. Physical activity and movement

IEssential not optional

Specific Supplements for Detoxification

Silymarin (Milk Thistle)

- *Hepatoprotective*
- *Potent detox agent*

N-acetyl cysteine (NAC)

- *Increases glutathione levels*
- *Improves detoxification of toxins*

Indole-3-carbinol (I3C)

- *Increases phase II enzyme glutathione S-transferase detoxification pathway*
- *Antioxidant*

Curcumin

- *Supports liver function*
- *Reduces nephrotoxic, oxidative, and histopathological impacts of toxic heavy metals*

Alpha Lipoic Acid

- *Antioxidant activity*
- *Supports antioxidants*
- *Reduces glutathione*

Fiber

Pectin = heavy metal chelation

Flaxseed

Useful in heavy metal chelation

Anti-inflammatory

Rice bran fiber

Supports elimination of man-made chemicals

Quercetin

Supports healthy glutathione levels

Supports decreased oxidation

Environmental Toxin Markers Measured [62]

Environmental Phenols
4-Nonylphenol
Bisphenol A (BPA)
Triclosan (TCS)

Herbicides
2,4-Dichlorophenoxyacetic Acid (2,4-D)
Atrazine
Atrazine mercapturate
Glyphosate

Other Markers	
Aryl Phosphate	Diphenyl Phosphate (DPP)
Acrylamide	N-acetyl-S-(2-carbamoylethyl)-cysteine (NAE)
Perchlorate (PERC)	

Mitochondrial Marker
Tiglylglycine (TG)
Parabens
Butylparaben
Ethylparaben
Methylparaben
Propylparaben

Pesticides		
Organochlorine Pesticide	**Organophosphate Pesticides**	
2,2-bis(4-Chlorophenyl) acetic acid (DDA)	Diethyl phosphate (DEP)	Dimethyl phosphate (DMP)
Pyrethroid Pesticide	Diethyldithiophosphate (DEDTP)	Dimethyldithiophosphate (DMDTP)
3-Phenoxybenzoic Acid (3PBA)	Diethylthiophosphate (DETP)	Dimethylthiophosphate (DMTP)

Phthalates
Mono-ethyl phthalate (MEP)
mono-2-ethylhexyl phthalate (MEHP)
mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)
mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)

Volatile Organic Compounds		
Xylene	**Benzene**	**1,3-Butadiene**
2-Methylhippuric Acid (2MHA)	N-acetyl phenyl cysteine (NAP)	N-Acetyl (3,4-Dihydroxybutyl) Cysteine (NADB)
3-Methylhippuric Acid (3MHA)	**1-Bromopropane**	**Acrylonitrile**
4-Methylhippuric Acid (4MHA)	N-Acetyl (Propyl) Cysteine (NAPR)	N-Acetyl (2-Cyanoethyl) Cysteine (NACE)
Styrene	**Propylene Oxide**	**Acrylonitrile, Ethylene Oxide**
Phenyl glyoxylic Acid (PGO)	N-Acetyl (2,Hydroxypropyl) Cysteine (NAHP)	2-Hydroxyethyl Mercapturic Acid (HEMA)
Methyl-tertiary-butyl ether (MTBE)	2-Hydroxyisobutyric Acid (2HIB)	

Revised 4/17/2023

Mold Testing (63)

Air Sampling:

Air sampling detects airborne mold in an indoor air

Pumps and filters trap airborne mold spores on nutrient substrate

Analysis microscopically @ 100-400x magnification identifies + counts mold

Structures identified are spores, hyphae, and fragments

- **Results are reported as spores/cubic meter to determine if levels exceed normal indoor ranges.**

(Home) Mold Testing [64]

Detailed Mold Report

(WATER-INDICATING FUNGI ARE SHOWN BELOW IN RED)

Analysis Method	Air Analysis	Air Analysis	Air Analysis
Lab Sample #	52221176-1	52221176-2	52221176-3
Sample Identification	26826572	26826576	26826571
Sample Location	BASEMENT	KITCHEN 1st FLOOR	OUTSIDE
Sample Type / Metric	Air-O-Cell/75.0L	Air-O-Cell/75.0L	Air-O-Cell/75.0L
Analysis Date	Tue October 09, 2018	Tue October 09, 2018	Tue October 09, 2018
Determination	**PROBLEM**	**NORMAL**	**CONTROL**

Fungal Types Identified	Raw Count	Spores / m^3	% of Total	Raw Count	Spores / m^3	% of Total	Raw Count	Spores / m^3	% of Total
✳INDOOR PROBLEM FUNGI									
Penicillium/Aspergillus	9,250	123,025	99	---	---	---	---	---	---
✳✳Non-Problem Fungi									
Alternaria	---	---	---	7	93	17	3	40	1
Ascospores	---	---	---	---	---	---	23	306	14
Basidiospores	3	40	<1	1	13	2	---	---	---

Mold Testing [65]

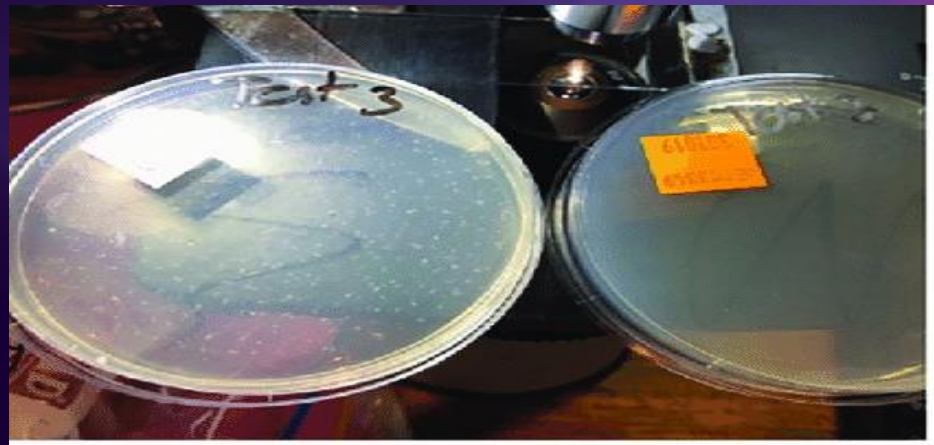
Swab Testing:

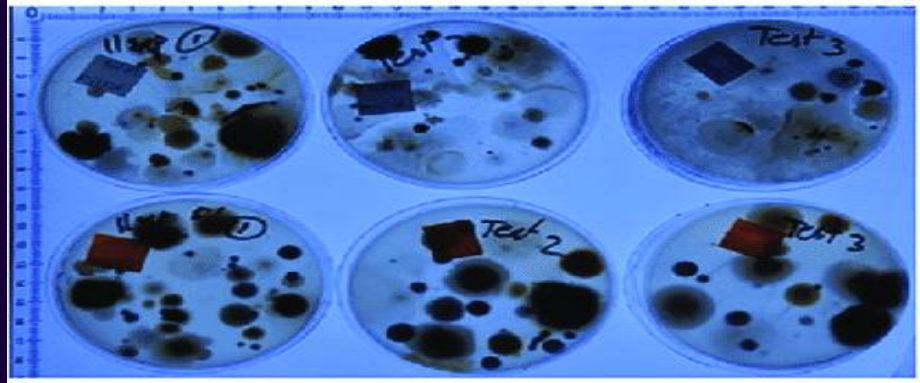
- Sterile cotton, rayon, or foam-tipped swabs are rubbed over a 4-10 inch moldy area
- Swabbing compresses spores/fragments onto the swab tip for lab analysis.
- Swabs are cultured onto nutrient-rich agar plates and incubated to grow any mold.
- Cultures are examined microscopically to identify mold structures
- DNA/antigen tests on swab extracts identify specific mold genera or species.
- Multiple swabs from different sites improve detection of all molds present.
- Positive swabs indicate an active mold source in that area.

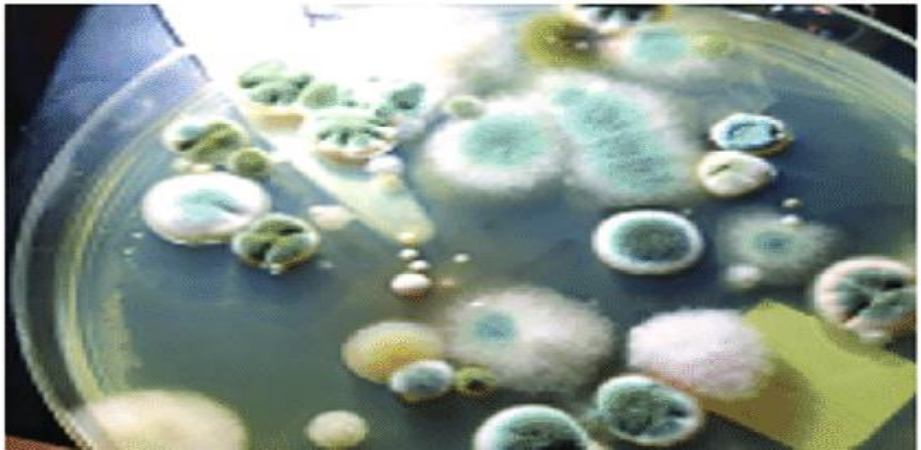
Air + Swab testing yields most comprehensive information on indoor mold contamination sources and exposures.

Sensitizing potential of molds is of 3-10% in the total population of Europe. [66]

Swab Testing [67]







Mycotoxin Testing

Urine [68]

1. Non-invasive method to detect mycotoxins and byproducts after exposure.
2. Measures free mycotoxins urinary metabolites directly in urine.
3. Analysis by HPLC, LC-MS/MS techniques.
4. Urine tests indicates recent exposures (within past 1-3 days)
5. Mycotoxins are rapidly eliminated from the body.

The Problem with Urine Testing

1. Mycotoxins, specifically trichothecenes, aflatoxins, and ochratoxins can be best determined in urine as a screening qualitative test [69]
2. No FDA-approved test for mycotoxins in human urine. [70]
3. Urine levels of mycotoxins mean excretion: it does not mean pathology.[71]

Urine Testing Example

LC/MS-MS (Liquid Chromatography/Tandem Mass Spectrometry) platform.

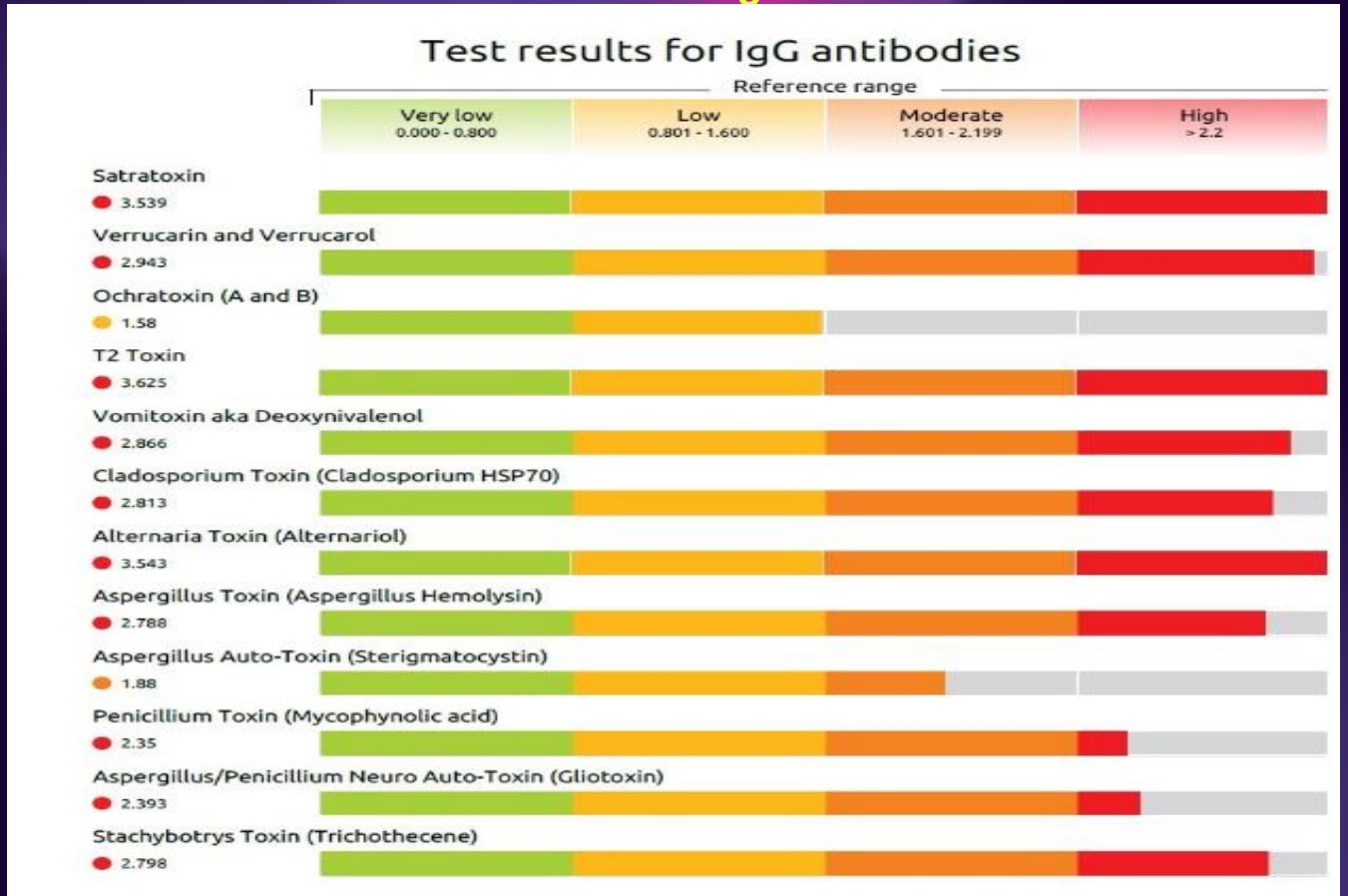
Mycotoxin Testing

Serum [71]

1. Allows detection of mycotoxin-protein or DNA adducts in blood from exposure.
2. Serum adducts provide information on long-term exposure (Weeks to months)
3. Preferable when trying to evaluate chronic or repeated exposure
4. Adducts are stable biomarkers. They don't break down quickly does parent mycotoxins
    a. Positive adduct = evidence of mycotoxin exposure (Parent compound need not be present in blood anymore.
5. Most accurate testing. Includes specificity and sensitivity mycotoxin antibodies.
6. Test for 12 distinct IGG and IgE Antibodies

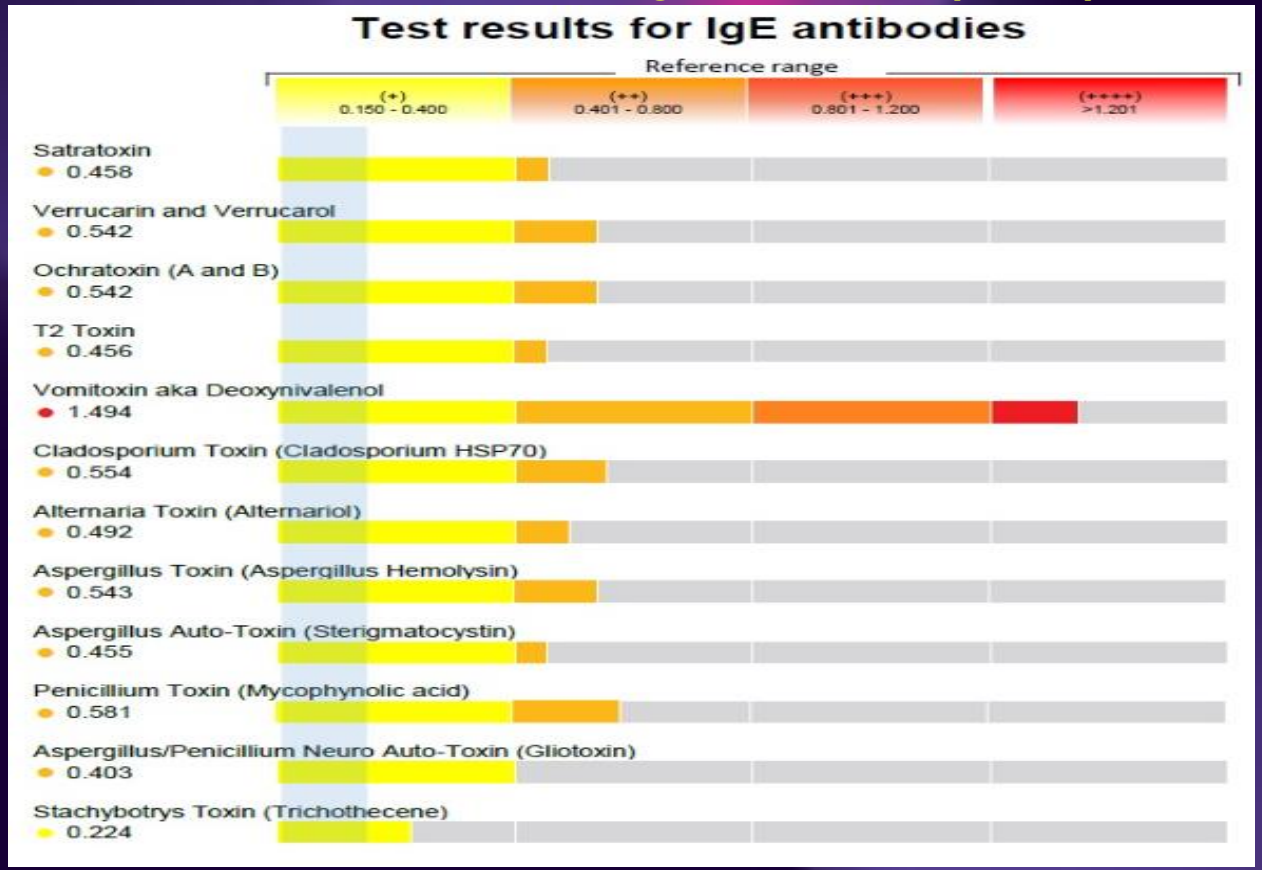
Serum Testing Example [72]

Test Results for IgG Antibodies



Serum Testing Example

Test Results for IgE Antibodies (MCAS)



Interpreting IgG Mycotoxin Testing [73]

- **IgG Antibodies:**
  - *Long-term defense against pathogens*

- **+ IgG Antibody= Long-term Exposure to Mycotoxins:**
  - *Indicative of ongoing or past exposure to mycotoxins*

- **Significance of Elevated IgG Level**

  Chronic immune response

Interpreting IgE Mycotoxin Testing [74]

- **Overview of IgE Antibodies:**
  - *Immediate hypersensitivity response*
  - *Think allergic responses*

- **IgE Responses and Acute Exposure**

  - *Elevated IgE indicates acute exposure signaling an immediate allergic reaction*

- **Elevated IgE Levels:**

  - *Reflect Mast Cell Activation*
  - *Triggers release of proinflammatory cytokines.*

Micronutrients: Essential Elements for Health

MICRONUTRIENT PANEL

R

VITAMINS

Bioti
Delta
tocotrienol MK4
MK7
Pantothenic
acid Vitamin A
Vitamin B1

131% Insufficient
130% Insufficient
118%

Vitamin
Vitamin B2
B3
Vitamin
B6
Vitamin
B9

115% Borderline

MINERALS

Boron
Calcium
Chromiu
m
Copper
Iodine

124% Insufficient
113%

Magnesium
Manganese
K1
Molybdenum
Selenium
Strontium
Vanadium

AMINO ACIDS

Arginine
Asparagine
Cysteine
Glycine
Histidine
Isoleucin
e Leucine

>140%Insufficient
>140%Insufficient
t 116%
Borderline

L-Tyrosine
Lysine
Methionine
Phenylalanin
e Taurine
Threonine
Tryptophan

>140%Insufficient
111% Borderline

OTHER NUTRIENTS

Glutamine
Carnitine
Choline
Coenzyme
Q10
Glutathione
Inositol

>140%Insufficient
>140%Insufficient
124% Insufficient

Lipoic Acid
Omega 3 DHA
Omega 3 EPA
Omega 9

100% - 109% Nutrient Sufficiency
110% - 119% Borderline
≥ 120% Insufficiency
Insufficiency*

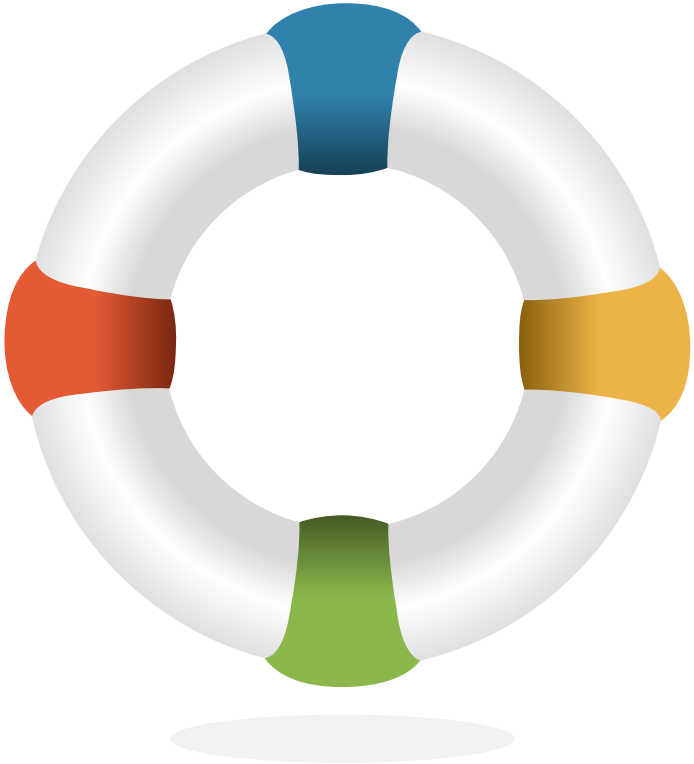
Essential Micronutrients Measured (75)

Vitamins

A,C,E,D,K, B1, B2, B3 B6,
B9, B12,BIOTIN
K1, K2, MK 7

Minerals

BORON, CALCIUM,
CHROMIUM, COPPER, IODINE,
IRON, LITHIUM, MAGNESIUM,
MANGANESE, MOLYBDENUM,
SELENIUM, STRONTIUM,
VANADIUM, ZINC

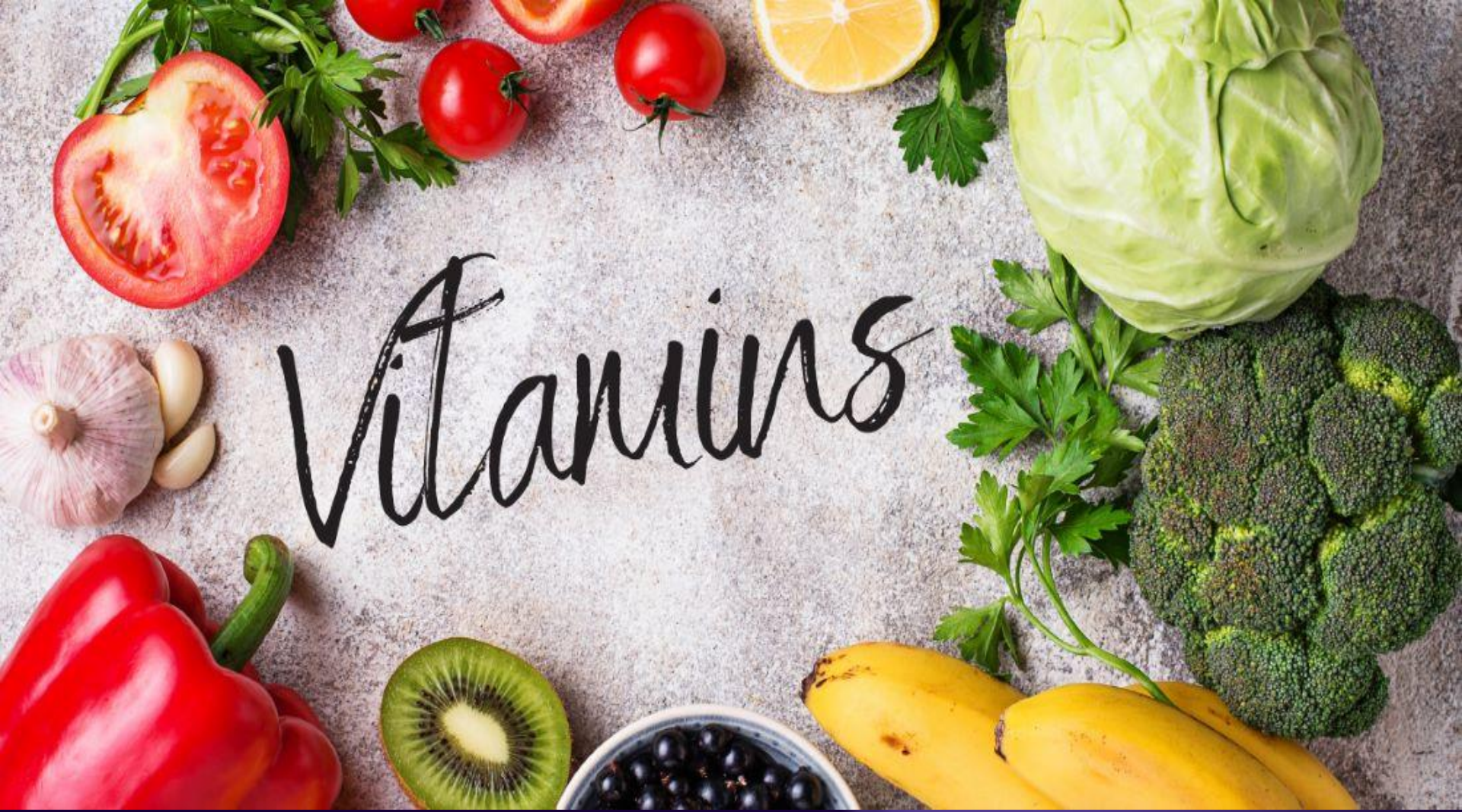


Other Nutrients

CARNITINE, CHOLINE, COENZYME
Q10, GLUTATHIONE, INOSITOL,
LIPOIC ACID, OMEGA 3 DHA,
OMEGA 3 EPA, OMEGA 9

Amino Acids

LEUCINE, VALINE,ISOLEUCINE
LYSINE, METHIONINE, TYROSINE,
ARGININE, TRYPTOPHAN,
THREONINE,HISTIDINE


Vitamins

Vitamins: The Vital Organic Compounds

Biotin (76)

Deficiency: Hair thinning, skin rash, fatigue.

Excess: Rare, may cause skin rashes or digestive upset in high doses.

Delta Tocotrienol (77)

Deficiency: Limited data, but deficiency may impact antioxidant protection.

Excess: Rare, high doses may cause bleeding issues.

Vitamin C (78)

Deficiency: Fatigue, scurvy, gum bleeding, poor wound healing.

Excess: Stomach upset, kidney stones, diarrhea.

Essential B Vitamins

Vitamin B1 (Thiamine) [79]

Deficiency: Fatigue, nerve damage, beriberi.

Excess: Rare, may cause headaches in extremely high doses.

Vitamin B2 (Riboflavin) [80]

Deficiency: Cracked lips, sore throat, skin disorders.

Excess: Rare, bright yellow urine in high doses.

Vitamin B3 (Niacin) [81]

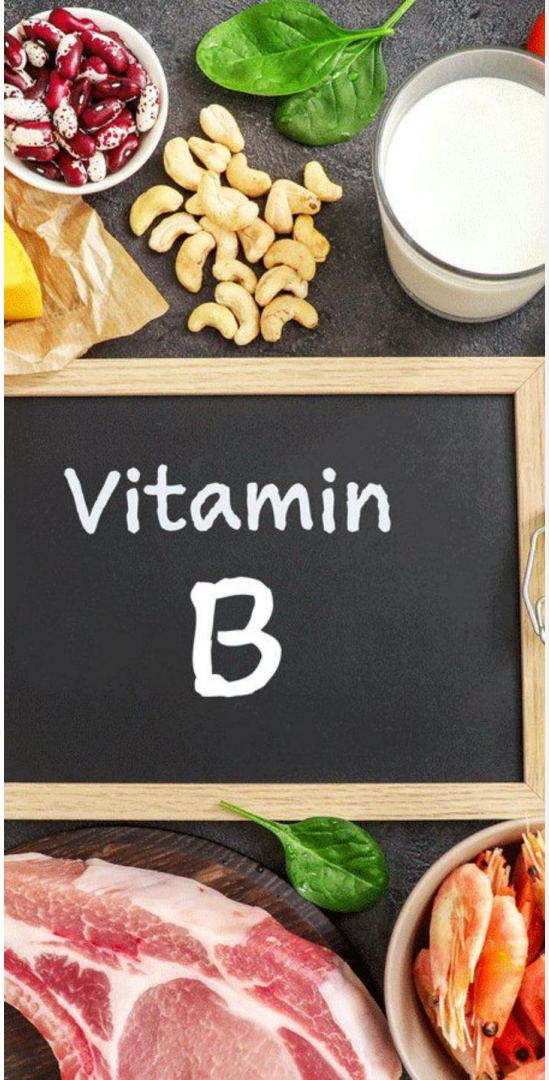
Deficiency: Fatigue, pellagra (diarrhea, dermatitis, dementia).

Excess: Flushing, liver toxicity, stomach upset.

Vitamin B6 (Pyridoxine) [82]

Deficiency: Nerve issues, depression, confusion.

Excess: Nerve damage, skin lesions with prolonged high intake.



Essential B Vitamins

Vitamin B-9 (Folate) **(83)**

Deficiency: Fatigue, anemia, poor cell growth

Excess: Masks B12 deficiency, GI upset w high doses

B-12 (Cobalamin) **(84)**

Deficiency: Fatigue, anemia, nerve damage, memory loss.

Excess: Rare, may cause acne or mild gastrointestinal issues

Fat-Soluble Vitamins

Vitamin D [85]

Deficiency: Weak bones, fatigue, muscle weakness, rickets.

Excess: Hypercalcemia, kidney damage, nausea.

Vitamin A [86]

Deficiency: Night blindness, dry skin, poor immunity.

Excess: Nausea, dizziness, liver damage, bone pain.

MK4 (Vitamin K2) [87]

Deficiency: Poor bone health excessive bleeding.

Excess: Rare, may interfere with blood clotting in high doses.

Vitamin K1 [88]

Deficiency: Excessive bleeding, bruising, poor clotting.

Excess: Rare, may cause clotting imbalances.

Fat-Soluble Vitamins

MK7 (Vitamin K2) **(89)**

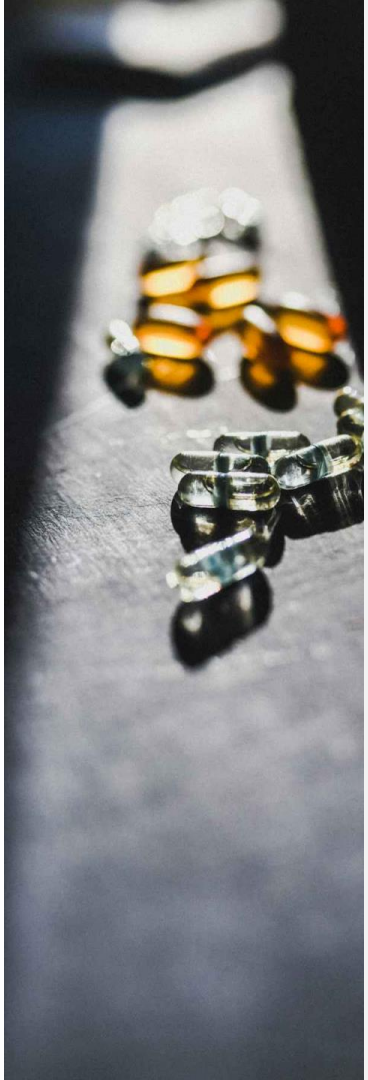
Deficiency: Poor calcium metabolism, increased fracture risk.

Excess: Rare, excessive blood clotting imbalances.

Vitamin E **(90)**

Deficiency: Nerve damage, muscle weakness, vision issues.

Excess: Increased bleeding risk, fatigue, diarrhea.



Essential Minerals

1

Calcium **(91)**

Deficiency: Weak bones, muscle cramps, poor nerve functio

Excess: Kidney stones, impaired absorption of other mineral constipation.

2

Iron **(92)**

Deficiency: Fatigue, anemia, pale skin, weakness.

Excess: Liver damage, oxidative stress, constipation.

3

Magnesium **(93)**

Deficiency: Muscle cramps, fatigue, irregular heartbeat.

Excess: Diarrhea, low blood pressure, heart irregularities.

4

Zinc **(94)**

Deficiency: Impaired wound healing, loss of taste/smell, hair loss.

Excess: Nausea, stomach pain, suppressed immunity, copper deficiency.

Trace Minerals

Selenium *(95)*
Deficiency: Fatigue, hair loss, weak immunity.

Excess: Hair loss, garlic breath, nerve damage, brittle nails.

Iodine *(96)*
Deficiency: Goiter, hypothyroidism, fatigue, weight gain.

Excess: Thyroid dysfunction, metallic taste, nausea.

Chromium *(97)*
Deficiency: Impaired glucose metabolism, increased diabetes risk.

Excess: Kidney or liver damage in very high doses.

Copper *(98)*
Deficiency: Anemia, weak immunity, brittle bones, fatigue.

Excess: Liver damage, gastrointestinal distress, neurological issues.

Other Minerals

5

Gymnema Sylvestre ***(99)***

Deficiency: Hyperglycemic S/S, Hunger, Sweet sensitivity

Excess: Hypoglycemic S/S, headache, nausea, lightheadedness, tremors

6

Lithium ***(100-101)***

Deficiency: depression. Mood changes

Excess: Renal damage, tremors, thyroid dysfunction, thirst

7

Molybdenum ***(102)***

Deficiency: Sulfite sensitivity, encephalopathy, seizures

Excess: Joint pain, gout-like S/S

8

Strontium ***(103-104)***

Deficiency: Osteoporosis, peripheral neuropathy.

Excess: Dermatitis, Stevens-Johnson Syndrome, Erythema multiforme

Essential Amino Acids

1

Lysine *(105)*

Deficiency: Fatigue, hair loss, poor immunity, reproductive issues.

Excess: Stomach pain, diarrhea, gallstones in extreme excess.

2

Methionine *(106)*

Deficiency: Fatigue, liver dysfunction, poor antioxidant capacity.

Excess: High homocysteine levels, cardiovascular risk, nausea.

3

Tryptophan *(107)*

Deficiency: Depression, insomnia, anxiety, irritability.

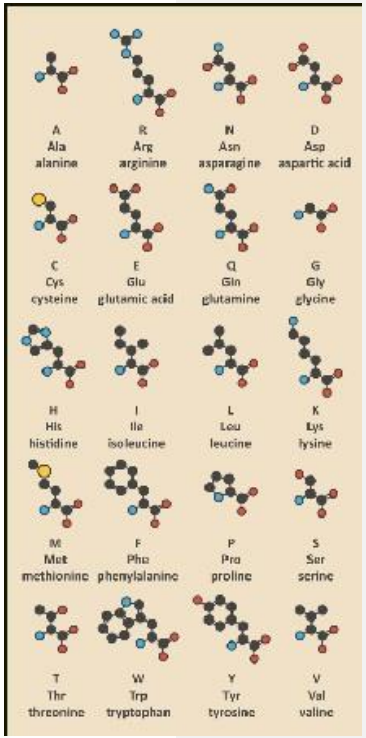
Excess: Nausea, dizziness, serotonin syndrome at very high levels.

4

Threonine *(108)*

Deficiency: Fatigue, weakened immunity, poor collagen production.

Excess: Imbalance in amino acid metabolism, gastrointestinal upset.



Other Essential Nutrients

Omega-3 Fatty Acids *(109)*

DHA Deficiency: Cognitive decline, poor eye health, inflammation.

DHA Excess: Bleeding issues, nausea, risk of vitamin A/D toxicity in high doses.

EPA Deficiency: Increased inflammation, poor cardiovascular health.

EPA Excess: Prolonged bleeding, potential immune suppression.

Coenzyme Q10 *(110)*

Deficiency: Fatigue, muscle weakness, heart health issues.

Excess: Rare, but may cause gastrointestinal discomfort in high doses.

Choline *(111)*

Deficiency: Fatty liver, memory issues, cognitive decline.

Excess: Fishy odor, low blood pressure, sweating, diarrhea.

Vitamin-Micronutrient Summary

MICRONUTRIENT	SYMPTOMS OF DEFICIENCY	SYMPTOMS OF EXCESS
Biotin	**- Hair thinning, skin rash, fatigue.**	**- Rare, may cause skin rashes or digestive upset in high doses.**
Delta Tocotrienol	**- Limited data, but deficiency may impact antioxidant protection.**	**- Rare, high doses may cause bleeding issues.**
MK4 (Vitamin K2)	**- Poor bone health, excessive bleeding.**	**- Rare, may interfere with blood clotting in high doses.**
MK7 (Vitamin K2)	**- Poor calcium metabolism, increased fracture risk.**	**- Rare, excessive blood clotting imbalances.**
Pantothenic Acid	**- Fatigue, irritability, numbness, muscle cramps.**	**- Rare, diarrhea or mild digestive issues.**
Vitamin A	**- Night blindness, dry skin, poor immunity.**	**- Nausea, dizziness, liver damage, bone pain.**

Vitamin-Micronutrient Summary

Micronutrient	Symptoms of Deficiency	Symptoms of Excess
Vitamin C	- Fatigue, scurvy, gum bleeding, poor wound healing.	- Stomach upset, kidney stones, diarrhea.
Vitamin D	- Weak bones, fatigue, muscle weakness, rickets.	- Hypercalcemia, kidney damage, nausea.
Vitamin K1	- Excessive bleeding, bruising, poor clotting.	- Rare, may cause clotting imbalances.

B Vitamins-Micronutrient Summary

Micronutrient	Symptoms of Deficiency	Symptoms of Excess
Vitamin B1 (Thiamine)	- Fatigue, nerve damage, beriberi.	- Rare, may cause headaches in extremely high doses.
Vitamin B2 (Riboflavin)	- Cracked lips, sore throat, skin disorders.	- Rare, bright yellow urine in high doses.
Vitamin B3 (Niacin)	- Fatigue, pellagra (diarrhea, dermatitis, dementia).	- Flushing, liver toxicity, stomach upset.
Vitamin B6 (Pyridoxine)	- Nerve issues, depression, confusion.	- Nerve damage, skin lesions with prolonged high intake.
Vitamin B9 (Folate)	- Anemia, fatigue, poor cell growth.	- Masks vitamin B12 deficiency, stomach upset in high doses.
Vitamin B12 (Cobalamin)	- Fatigue, anemia, nerve damage, memory loss.	- Rare, may cause acne or mild gastrointestinal issues.

Amino Acid Micronutrient Summary

Amino Acid	Symptoms of Deficiency	Symptoms of Excess
Arginine	- Poor wound healing, immune dysfunction, infertility.	- Gastrointestinal distress, hypotension, imbalances in amino acid metabolism.
Asparagine	- Fatigue, poor immune response, impaired protein synthesis.	- Limited data, but may cause neurotoxicity in extreme amounts.
Cysteine	- Weak hair/nails, oxidative stress, impaired detoxification.	- Nausea, diarrhea, neurological issues, potential kidney damage.
Glycine	- Poor collagen synthesis, joint issues, fatigue.	- Drowsiness, nausea, metabolic imbalances.
Histidine	- Anemia, reduced histamine production, skin disorders.	- Imbalance in neurotransmitter activity, headaches.
Isoleucine	- Fatigue, muscle weakness, poor endurance.	- Rare, but may lead to imbalances with other branched-chain amino acids.
Leucine	- Muscle loss, low energy, poor wound healing.	- Hypoglycemia, potential interference with other amino acids.
L-Glutamine	- Muscle wasting, fatigue, impaired gut and immune health.	- Gastrointestinal upset, potential metabolic imbalances.

Amino Acid-Micronutrient Summary [113]

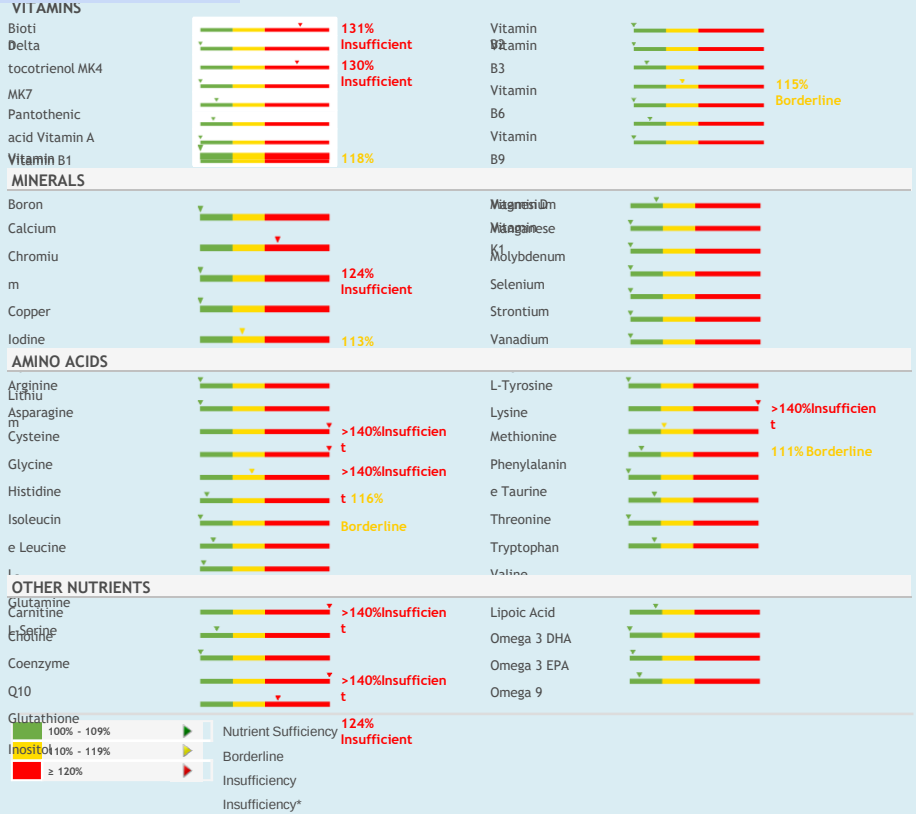
Amino Acid	Symptoms of Deficiency	Symptoms of Excess
L-Serine	- Neurological issues, cognitive decline, immune dysfunction.	- Rare, but high levels may lead to toxicity in the central nervous system.
L-Tyrosine	- Fatigue, depression, low thyroid hormone production.	- Insomnia, restlessness, heart palpitations.
Lysine	- Fatigue, hair loss, poor immunity, reproductive issues.	- Stomach pain, diarrhea, gallstones in extreme excess.
Methionine	- Fatigue, liver dysfunction, poor antioxidant capacity.	- High homocysteine levels, cardiovascular risk, nausea.
Phenylalanine	- Depression, memory issues, low energy.	- Anxiety, headaches, high blood pressure.
Taurine	- Muscle weakness, poor eye health, reduced antioxidant protection.	- Rare, but high doses may cause low blood pressure, drowsiness.
Threonine	- Fatigue, weakened immunity, poor collagen production.	- Imbalance in amino acid metabolism, gastrointestinal upset.
Tryptophan	- Depression, insomnia, anxiety, irritability.	- Nausea, dizziness, serotonin syndrome at very high levels.
Valine	- Fatigue, muscle weakness, poor mental focus.	- Imbalances with other branched-chain amino acids, gastrointestinal issues.

Nutrient	Symptoms of Deficiency	Symptoms of Excess
Carnitine	- Muscle weakness, fatigue, impaired fat metabolism.	- Fishy body odor, gastrointestinal distress, diarrhea.
Choline	- Fatty liver, memory issues, cognitive decline.	- Fishy odor, low blood pressure, sweating, diarrhea.
Coenzyme Q10	- Fatigue, muscle weakness, heart health issues.	- Rare, but may cause gastrointestinal discomfort in high doses.
Glutathione	- Oxidative stress, weakened immunity, poor detoxification.	- Rare, but excessive supplementation may cause bloating or cramps.
Inositol	- Anxiety, depression, metabolic imbalances.	- Gastrointestinal upset, dizziness at very high doses.
Lipoic Acid	- Oxidative stress, impaired energy production.	- Nausea, low blood sugar, potential mineral imbalances.
Omega 3 DHA	- Cognitive decline, poor eye health, inflammation.	- Bleeding issues, nausea, risk of vitamin A/D toxicity in high doses.
Omega 3 EPA	- Increased inflammation, poor cardiovascular health.	- Prolonged bleeding, potential immune suppression.
Omega 9	- Dry skin, poor cardiovascular health.	- Rare, may lead to weight gain or interference with omega-3/6 balance.

Other Micronutrients

MICRONUTRIENT PANEL

John Doe




SUMMARY

Lab Studies

Central	*Peripheral*
General	CBC, Chem Profile, Insulin, HbA1C, Lipid Profile, cRP, Homocysteine, 25-OH Vit D, Pregnenolone, PSA (Total and fractionated), Prolactin
TSH	Free T3, free T4, Reverse T3, TPO, Antithyroglobulin, TSI (If S/S =Hyperthyroid) Spot Urine Iodine
LH/FSH	Testosterone, (free, total) DHEA-S, SHBG; Male-DHT, Estradiol, Progesterone Female-Estrone, Estradiol, Progesterone
ACTH	Cortisol A.M. and P.M. or 4 Point Cortisol Saliva Test
GH	IGF-1, (Main) Growth Hormone, (Before 10 AM), IGFBP3
Others	RBC-Magnesium, RBC-Zinc, ESR, LDH total and fractionated LP-PLA2, Myeloperoxidase (MPO), NTX

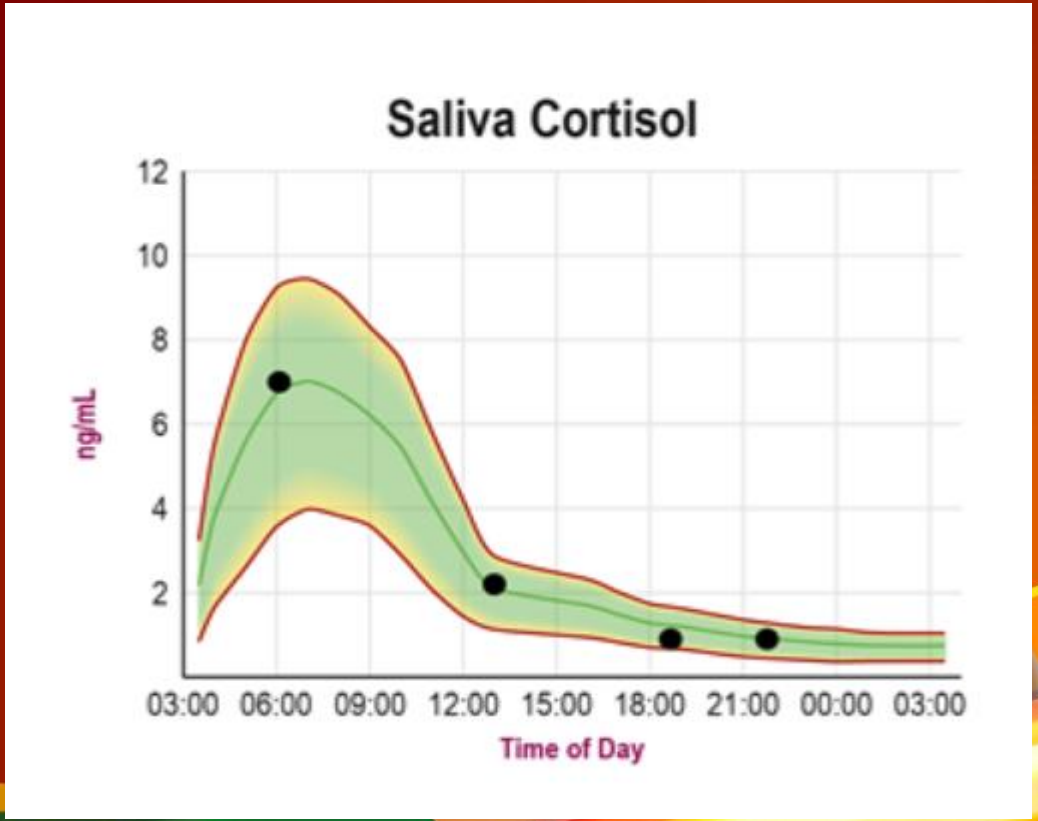
Advanced Testing

1. *24 Hour 4 Point Cortisol Test*
2. *Functional GI Test*
    a. *SIBO Breath Test*
3. *Mucosal Barrier Assessment*
4. *Metabolic Wellness*
5. *Food Sensitivities IgG-Delayed Sensitivities)*
6. *Toxicities*
    a. *Heavy Metal*
    b. *Mold-Serum IgG, IgE; Urine*
    c. *Environmental*
7. *Micronutrients*

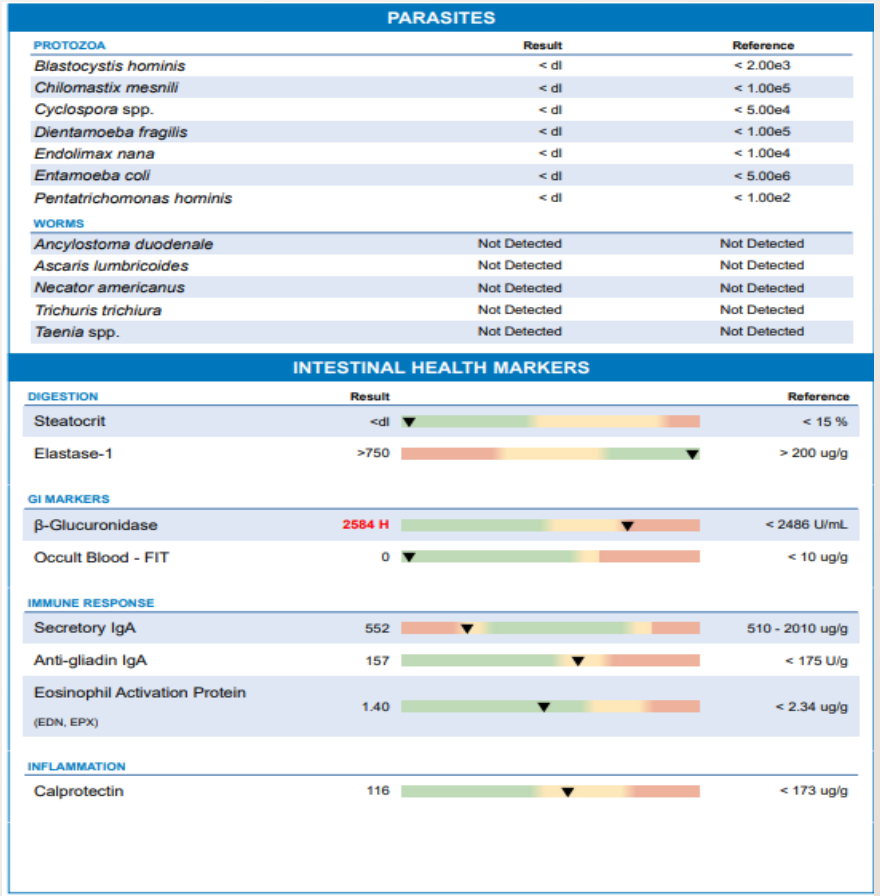
24 Hour Saliva Cortisol Test

Saliva is representative of the bioavailability of cortisol to target tissues throughout the body.

https://www.zrtlab.com/blog/archive/cortisol-testing-saliva-urine-and-blood-spot



Comprehensive Stool Testing



PARASITES

PROTOZOA	Result	Reference
Blastocystis hominis	< dl	< 2.00e3
Chilomastix mesnili	< dl	< 1.00e5
Cyclospora spp.	< dl	< 5.00e4
Dientamoeba fragilis	< dl	< 1.00e5
Endolimax nana	< dl	< 1.00e4
Entamoeba coli	< dl	< 5.00e6
Pentatrichomonas hominis	< dl	< 1.00e2
WORMS		
Ancylostoma duodenale	Not Detected	Not Detected
Ascaris lumbricoides	Not Detected	Not Detected
Necator americanus	Not Detected	Not Detected
Trichuris trichiura	Not Detected	Not Detected
Taenia spp.	Not Detected	Not Detected

INTESTINAL HEALTH MARKERS

DIGESTION	Result	Reference
Steatocrit	<dl	< 15 %
Elastase-1	>750	> 200 ug/g
GI MARKERS		
β-Glucuronidase	2584 H	< 2486 U/mL
Occult Blood - FIT	0	< 10 ug/g
IMMUNE RESPONSE		
Secretory IgA	552	510 - 2010 ug/g
Anti-gliadin IgA	157	< 175 U/g
Eosinophil Activation Protein (EDN, EPX)	1.40	< 2.34 ug/g
INFLAMMATION		
Calprotectin	116	< 173 ug/g

Steatocrit–*Fecal Fat (High = Malabsorption)*

Elastase 1–*Pancreatic Enzymes;*
Reflects overall enzyme production:
amylase, lipase and protease

B-Glucuronidase–*Dysbiosis, Liver Detox Impairment,*
Estrogen Induced Diseases

Occult Blood–+ = *Present even if microscopic*

Secretory IgA–*Primary immune globulin in GI Tract*
High=Infection, Dysbiosis, Food Sensitivity
Low=Dysbiosis, Stress, Immune Compromise

Anti Gliadin IgA–*Immune Response to Gluten*

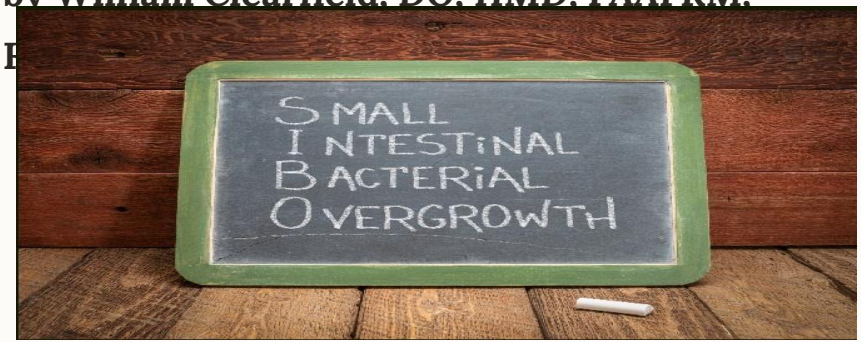
Eosinophil Activation Protein–*Infections, Allergic Rx*

Calprotectin–*IBD (Crohn's, U.C.)VS. IBS (Benign)*
"Gold Standard" Inflammatory Marker

Zonulin–*Intestinal Permeability*

Small Intestinal Bacterial Overgrowth (SIBO)

by William Clearfield, DO, HMD, FAAFRM,

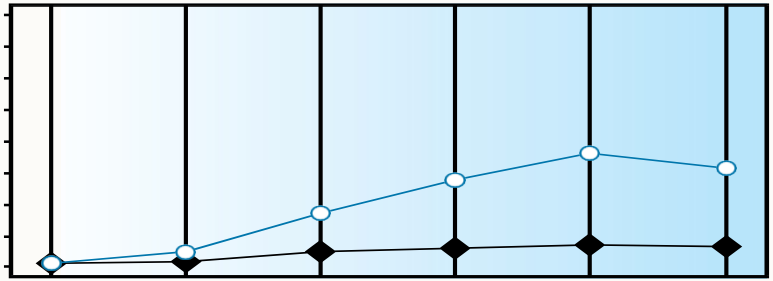


Evaluation for Hydrogen (H_2)		
Hydrogen increase over baseline by 90 minutes		
	Result	Expected Value
Change in H_2	70 <20 ppm	H
A rise of ≥ 20 ppm from baseline in hydrogen by 90 min should be considered a positive test to suggest the presence of SIBO.		

Evaluation for Methane (CH_4)		
Peak methane level at any point		
	Result Expected Value	
CH_4 Peak	13 <10 ppm	H
A peak methane level ≥ 10 ppm at any point is indicative of a methane-positive result.		

Small Intestinal Bacterial Overgrowth (SIBO)
2 Hour- Breath Test

Hydrogen (H2) and Methane Gases (CH4) Breath Gases



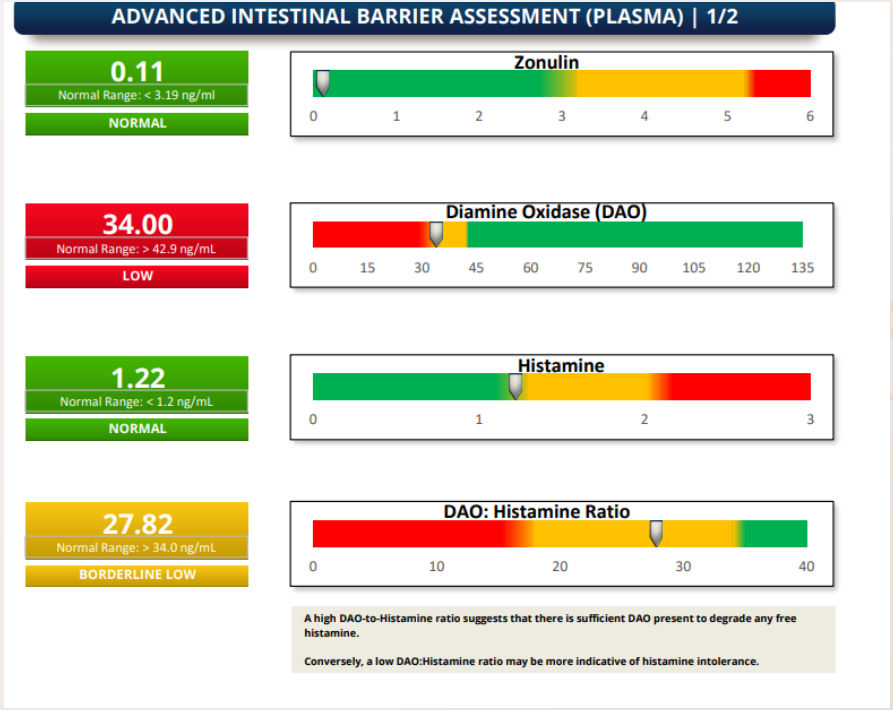
Hydrogen (H_2), Methane (CH_4), and Carbon Dioxide (CO_2) (ppm)						
	Baseline 0 min (S1)	20 min (S2)	40 min (S3)	60 min (S4)	90 min (S5)	120 min (S6)
H_2	2	9	33	55	72	62
CH_4	<2	3	9	11	13	12
H_2 + CH_4	NR	12	42	66	85	74
CO_2**						

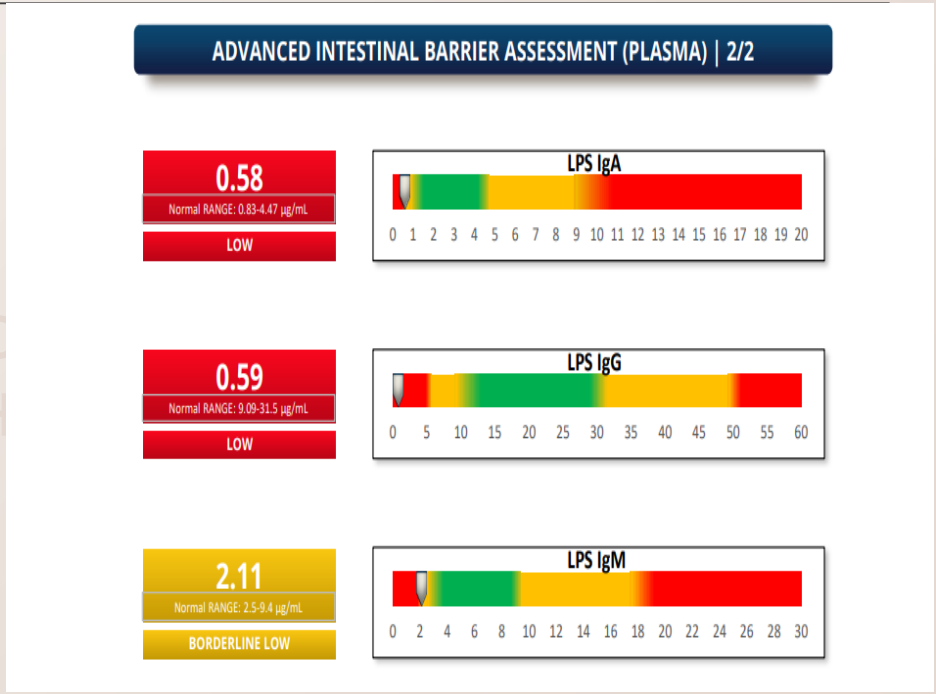
Actual Collection Times						
Actual Time	9:34	9:54	10:14	10:34	11:04	11:34
Actual Interval	0 min	20 min	40 min	60 min	90 min	120 min

**CO_2 is measured for quality assurance. indicates the CO_2 level is acceptable. indicates room air contamination exceeding acceptable limits.

Mucosal Barrier (81)

Read It Here First! *Stateline, Nevada* *January, 2025*





Metabolic Wellness Profile (82)

Markers for

1. Digestion

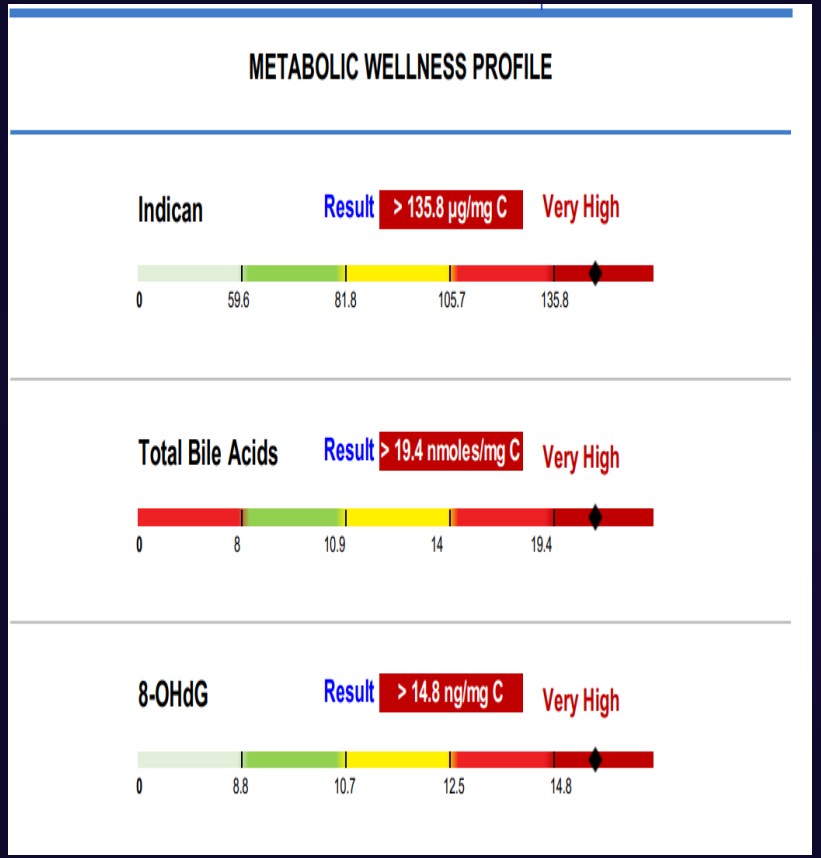
i. Urinary Indican

1. Detoxification

i. Urinary Bile Acids

1. Oxidative Stress

8-Hydroxy-2-Deoxyguanosine (8-OHdG)



Food Sensitivity Panel

PATIENT INFORMATION
Sample Patient
DOB: 00/00/0000
REQUISITION ID: 0000000

PROVIDER INFORMATION
Sample Provider
Street Address
City, State 00000

184 IgG Food Panel

SPECIMEN TYPE:

COLLECTION DATE: 00/00/0000

REPORT DATE: 00/00/0000

TEST	SCORE	CLASS	TEST
MEAT & POULTRY			
Beef	0.154	0	
Buffalo	0.159	0	
Chicken	0.194	0	
Duck	0.163	0	
Lamb	0.161	0	
Pork	0.160	0	
Turkey	0.195	0	
Venison	0.179	0	
FISH & SHELLFISH			
Anchovy	0.179	0	
Bass	0.190	0	
Clam	0.179	0	
Codfish	0.176	0	
Crab	**0.233**	**1**	
Flounder	0.166	0	
Haddock	**0.227**	**1**	
Halibut	0.169	0	
Herring	0.189	0	
Lobster	0.193	0	
Mackerel	0.173	0	
Mussel	0.171	0	
Oyster	**0.226**	**1**	
Perch	**0.241**	**1**	
Red Snapper	0.175	0	
Salmon	0.198	0	
Scallop	0.174	0	
Shrimp	0.169	0	
Sole	0.173	0	
Squid	**0.242**	**1**	
Swordfish	0.178	0	
Trout	0.188	0	
Tuna	0.159	0	
Walleye Pike	0.190	0	
GRAINS & STARCHES			
Amaranth	**0.210**	**1**	
Arrowroot	**0.243**	**1**	
Barley Bran	0.164	0	
Buckwheat	0.168	0	
Corn	0.191	0	
Gluten	0.160	0	
Hops	0.176	0	
Malt	**0.222**	**1**	
	0.165	0	
Millet	0.196	0	
Oats	0.174	0	
Quinoa	0.193	0	
Rice	0.184	0	
Rye	0.186	0	
Sorghum	0.178	0	
Tapioca	0.170	0	
Teff	0.176	0	
Wheat	0.190	0	

SCORE	CLASS	TEST	SCORE	CLASS	TEST	SCORE	CLASS
DAIRY & EGG			**NUTS, SEEDS & OILS**				
Artichoke	**0.225**	**1**	**Blue Cheese**	**0.241**	**1**	Almond	0.157	0
Asparagus	0.173	0	Casein	0.190	0	Brazil Nut	0.190	0
Beans	0.163	0	Cheddar Cheese	0.169	0	Canola	0.162	0
Bell Pepper	0.154	0	**Egg White**	**0.217**	**1**	Cashew	0.171	0
Broccoli	0.154	0	**Egg Yolk**	**0.241**	**1**	**Chestnut**	**0.237**	**1**
Brussel Sprouts	0.169	0	Milk, Cow's	0.166	0	**Chia Seed**	**0.241**	**1**
Cabbage	0.155	0	Milk, Goat's	0.172	0	Cola	0.186	0
Carrot	0.178	0	Milk, Sheep's	0.188	0	Flaxseed	0.161	0
Cauliflower	0.169	0	**Mozzarella Cheese**	**.210**	**1**	Hazelnut	0.175	0
Celery	0.159	0	Swiss Cheese	176	0	Hemp	0.195	0
Cucumber	0.159	0	**Whey Yogurt**	**.238**	**1**	Macadamia Nut	0.166	0
Eggplant	0.157	0		176	0	Pecan	0.160	0
Garlic	0.180	0	**FRUITS**			Pine Nut	0.196	0
Green Bean	0.190	0	**Apple**			Pistachio	0.183	0
Kale	0.167	0	Apricot	177	0	Poppy Seed	0.178	0
Kelp	**0.208**	**1**	**Avocado**	166	0	Safflower	0.190	0
Lettuce	0.169	0	Banana	**.234**	**1**	Sesame	0.192	0
Mushroom	0.196	0	Blackberry	176	0	Sunflower Seed	0.188	0
Okra	0.183	0	Blueberry	188	0	Walnut	0.181	0
Olive, Green	0.173	0	Cantaloupe	156	0	**HERBS, SPICES, FLAVORINGS**		
Onion Parsnip	0.170	0	Cherry	160	0	**Basil**	**0.235**	**1**
Potato Potato	0.159	0	Coconut	159	0	**Black Pepper**	**0.217**	**1**
Sweet	0.182	0	**Cranberry**	176	0	**Cilantro/Coriander**	**0.237**	**1**
Pumpkin	0.193	0	Date	**.233**	**1**	Cinnamon	0.166	0
Radish	0.175	0	**Fig**	177	0	**Cloves**	**0.236**	**1**
Spinach	**0.235**	**1**	Grape	**.228**	**1**	Dill	0.173	0
Squash	**0.235**	**1**	Grapefruit	181	0	Fennel Seed	0.175	0
Tomato Turnip	0.156	0	Honeydew	157	0	Ginger	0.164	0
Zucchini	0.160	0	**Kiwi**	176	0	Ginseng	0.165	0
	0.198	0	Lemon	**.233**	**1**	Horseradish	0.165	0
	0.171	0	Lime	177	0	Licorice	0.188	0
LEGUMES & PULSES				175	0	Mustard	0.183	0
Black Bean	0.174	0	**Mango**	**.202**	**1**	Nutmeg	0.165	0
Black-eyed Peas	0.170	0	Orange	168	0	**Oregano**	**0.235**	**1**
Chickpea	0.164	0	Papaya	175	0	**Paprika**	**0.221**	**1**
Green Pea	0.177	0	Peach Pear	0.150	0	Parsley	0.165	0
Kidney Bean	**0.229**	**1**	Pineapple	0.174	0	Peppermint	0.198	0
Lentil Lima	0.185	0	Plum	0.155	0	Rosemary	0.193	0
Bean Navy	0.152	0	Raspberry	0.166	0	Sage	0.197	0
Bean	0.187	0	Rhubarb	0.158	0	Tarragon	0.172	0
Peanut	**0.223**	**1**	Strawberry	0.161	0	**Thyme**	**0.235**	**1**
Pinto Bean	0.194	0	Tangerine	0.162	0	**Turmeric**	**0.237**	**1**
Soybean	0.180	0	Watermelon	0.190	0	Vanilla Bean	0.186	0
			BEVERAGES & MISC				
			Black Tea	0.191	0		
			Carob	0.190	0		
			Cocoa	0.174	0		
			Coffee	0.183	0		
			Green Tea	0.195	0		
			Honey	0.191	0		
					1		
					1		

Reference Range

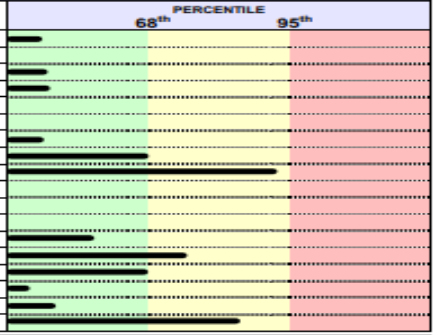
<= 0.199 = CLASS 0	0.200 - 0.299 = CLASS 1	0.300 - 0.399 = CLASS 2	>= 0.400 = CLASS 3
No Sensitivity Detected	Low Sensitivity Detected	Moderate Sensitivity Detected	High Sensitivity Detected

Heavy Metal Hair

Toxic & Essential Elements; Hair

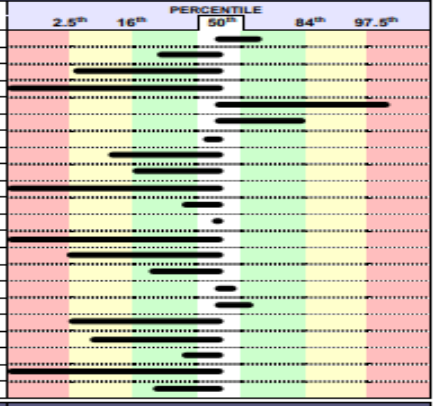
TOXIC METALS

		RESULT µg/g	REFERENCE INTERVAL
Aluminum	(Al)	1.5	< 7.0
Antimony	(Sb)	< 0.01	< 0.066
Arsenic	(As)	0.027	< 0.080
Barium	(Ba)	0.29	< 1.0
Beryllium	(Be)	< 0.01	< 0.020
Bismuth	(Bi)	< 0.002	< 2.0
Cadmium	(Cd)	0.021	< 0.065
Lead	(Pb)	0.82	< 0.80
Mercury	(Hg)	2.8	< 0.80
Platinum	(Pt)	< 0.003	< 0.005
Thallium	(Tl)	< 0.001	< 0.002
Thorium	(Th)	< 0.001	< 0.002
Uranium	(U)	0.036	< 0.060
Nickel	(Ni)	0.31	< 0.20
Silver	(Ag)	0.08	< 0.08
Tin	(Sn)	0.05	< 0.30
Titanium	(Ti)	0.21	< 0.60
Total Toxic Representation			



ESSENTIAL AND OTHER ELEMENTS

		RESULT µg/g	REFERENCE INTERVAL
Calcium	(Ca)	554	200– 750
Magnesium	(Mg)	31	25– 75
Sodium	(Na)	7	20– 180
Potassium	(K)	3	9– 80
Copper	(Cu)	64	11– 30
Zinc	(Zn)	200	130– 200
Manganese	(Mn)	0.14	0.08– 0.50
Chromium	(Cr)	0.37	0.40– 0.70
Vanadium	(V)	0.018	0.018– 0.065
Molybdenum	(Mo)	0.010	0.025– 0.060
Boron	(B)	0.82	0.40– 3.0
Iodine	(I)	0.54	0.25– 1.8
Lithium	(Li)	< 0.004	0.007– 0.020
Phosphorus	(P)	126	150– 220
Selenium	(Se)	0.75	0.70– 1.2
Strontium	(Sr)	1.4	0.30– 3.5
Sulfur	(S)	48100	44000– 50000
Cobalt	(Co)	0.003	0.004– 0.020
Iron	(Fe)	5.0	7.0– 16
Germanium	(Ge)	0.033	0.030– 0.040
Rubidium	(Rb)	< 0.003	0.011– 0.12
Zirconium	(Zr)	0.035	0.020– 0.44



SPECIMEN DATA

COMMENTS:

Date Collected: 05/16/2017
Date Received: 05/23/2017
Date Completed: 05/25/2017
Methodology: ICP/MS

Sample Size: 0.199 g
Sample Type: Head
Hair Color:
Treatment:
Shampoo:

RATIOS

ELEMENTS	RATIOS	RANGE
Ca/Mg	17.9	4– 30
Ca/P	4.4	0.8– 8
Na/K	2.33	0.5– 10
Zn/Cu	3.13	4– 20
Zn/Cd	> 999	> 800

Heavy Metal Urine

Toxic Metals; urine

TOXIC METALS		RESULT µg/g Creat	REFERENCE INTERVAL	WITHIN REFERENCE / OUTSIDE REFERENCE
Aluminum	(Al)	1.6	< 15	
Antimony	(Sb)	0.074	< 0.18	
Arsenic	(As)	12	< 40	
Barium	(Ba)	0.88	< 5	
Beryllium	(Be)	<dl	< 0.10	
Bismuth	(Bi)	0.091	< 0.8	
Cadmium	(Cd)	0.35	< 0.6	
Cesium	(Cs)	11	< 9	
Gadolinium	(Gd)	<dl	< 0.5	
Lead	(Pb)	2.1	< 1.1	
Mercury	(Hg)	0.55	< 0.8	
Nickel	(Ni)	7.7	< 4	
Palladium	(Pd)	<dl	< 0.2	
Platinum	(Pt)	<dl	< 0.1	
Tellurium	(Te)	<dl	< 0.2	
Thallium	(Tl)	2.2	< 0.4	
Thorium	(Th)	<dl	< 0.007	
Tin	(Sn)	0.19	< 3	
Tungsten	(W)	<dl	< 0.4	
Uranium	(U)	<dl	< 0.03	

URINE CREATININE	RESULT mg/dL	REFERENCE INTERVAL	-2SD -1SD MEAN +1SD +2SD
Creatinine	32.5	35 – 240	

Environmental Toxin Markers Measured

Environmental Phenols
4-Nonylphenol
Bisphenol A (BPA)
Triclosan (TCS)

Herbicides
2,4-Dichlorophenoxyacetic Acid (2,4-D)
Atrazine
Atrazine mercapturate
Glyphosate

Other Markers	
Aryl Phosphate	Diphenyl Phosphate (DPP)
Acrylamide	N-acetyl-S-(2-carbamoylethyl)-cysteine (NAE)
Perchlorate (PERC)	

Mitochondrial Marker
Tiglylglycine (TG)
Parabens
Butylparaben
Ethylparaben
Methylparaben
Propylparaben

Pesticides		
Organochlorine Pesticide	Organophosphate Pesticides	
2,2-bis(4-Chlorophenyl) acetic acid (DDA)	Diethyl phosphate (DEP)	Dimethyl phosphate (DMP)
Pyrethroid Pesticide	Diethyldithiophosphate (DEDTP)	Dimethyldithiophosphate (DMDTP)
3-Phenoxybenzoic Acid (3PBA)	Diethylthiophosphate (DETP)	Dimethylthiophosphate (DMTP)

Phthalates
Mono-ethyl phthalate (MEP)
mono-2-ethylhexyl phthalate (MEHP)
mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)
mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)

Volatile Organic Compounds		
Xylene	Benzene	1,3-Butadiene
2-Methylhippuric Acid (2MHA)	N-acetyl phenyl cysteine (NAP)	N-Acetyl (3,4-Dihydroxybutyl) Cysteine (NADB)
3-Methylhippuric Acid (3MHA)	1-Bromopropane	Acrylonitrile
4-Methylhippuric Acid (4MHA)	N-Acetyl (Propyl) Cysteine (NAPR)	N-Acetyl (2-Cyanoethyl) Cysteine (NACE)
Styrene	Propylene Oxide	Acrylonitrile, Ethylene Oxide
Phenyl glyoxylic Acid (PGO)	N-Acetyl (2,Hydroxypropyl) Cysteine (NAHP)	2-Hydroxyethyl Mercapturic Acid (HEMA)
Methyl-tertiary-butyl ether (MTBE)	2-Hydroxyisobutyric Acid (2HIB)	

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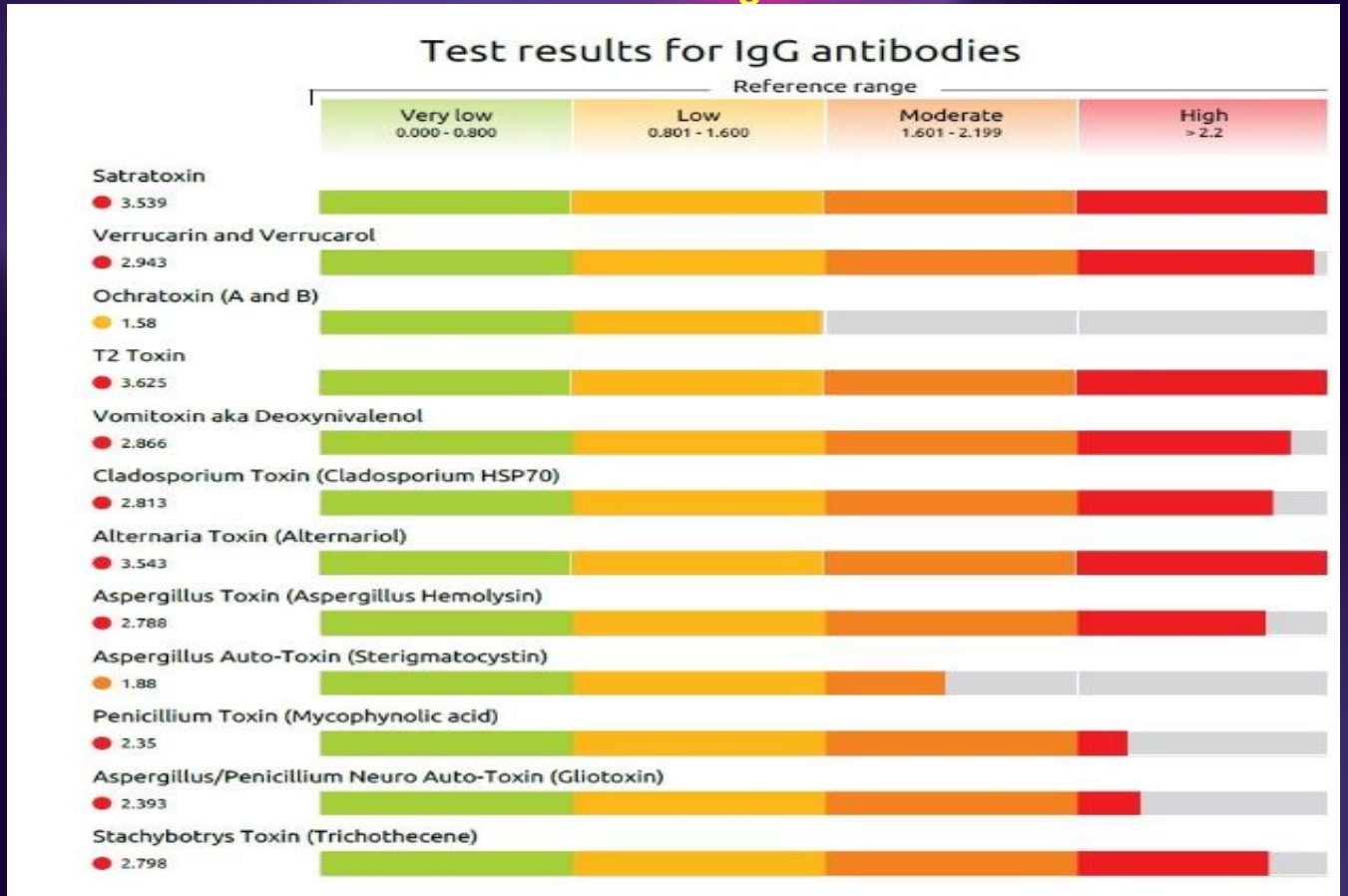
Urine Testing Example

LC/MS-MS (Liquid Chromatography/Tandem Mass Spectrometry) platform.

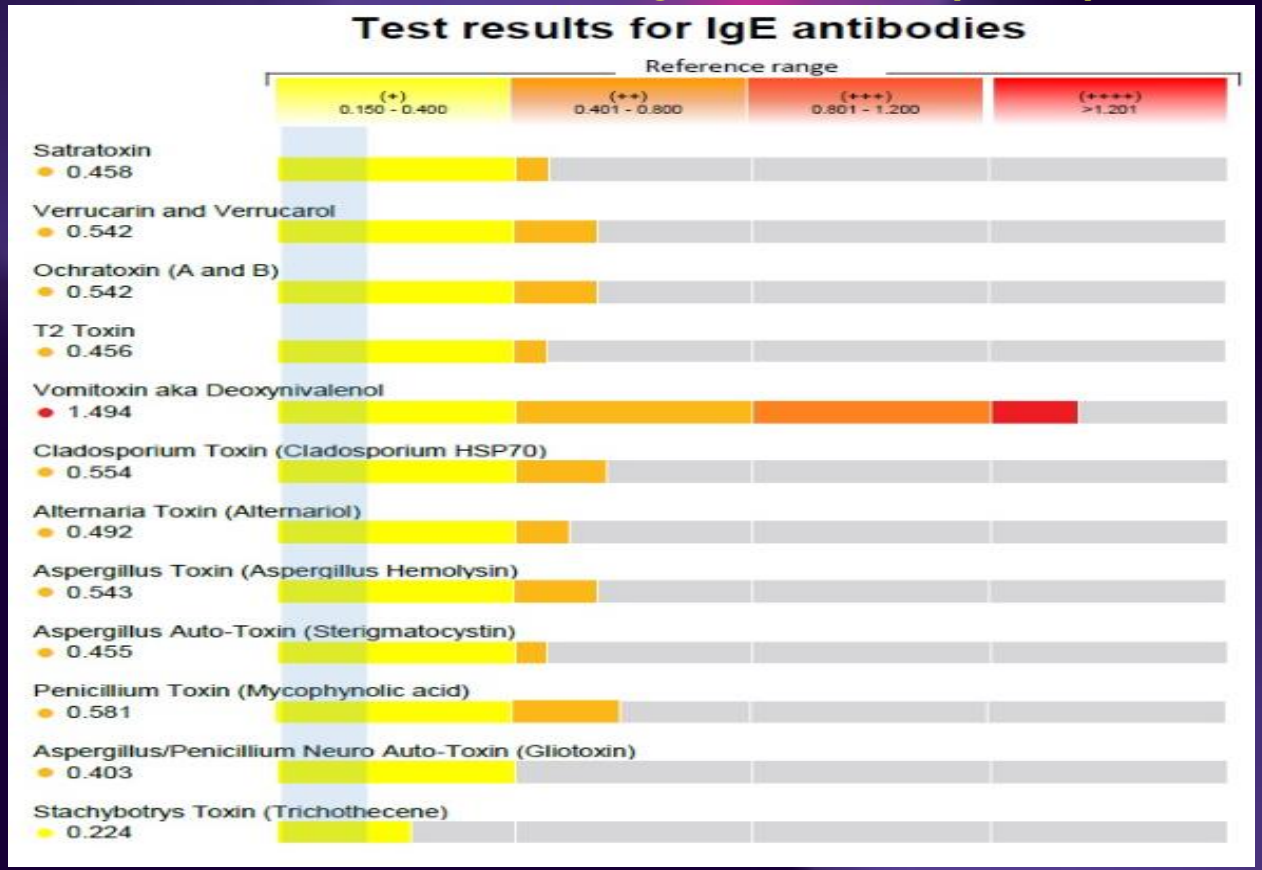
Serum Testing Example [21]

Test Results for IgG Antibodies



Serum Testing Example

Test Results for IgE Antibodies (MCAS)



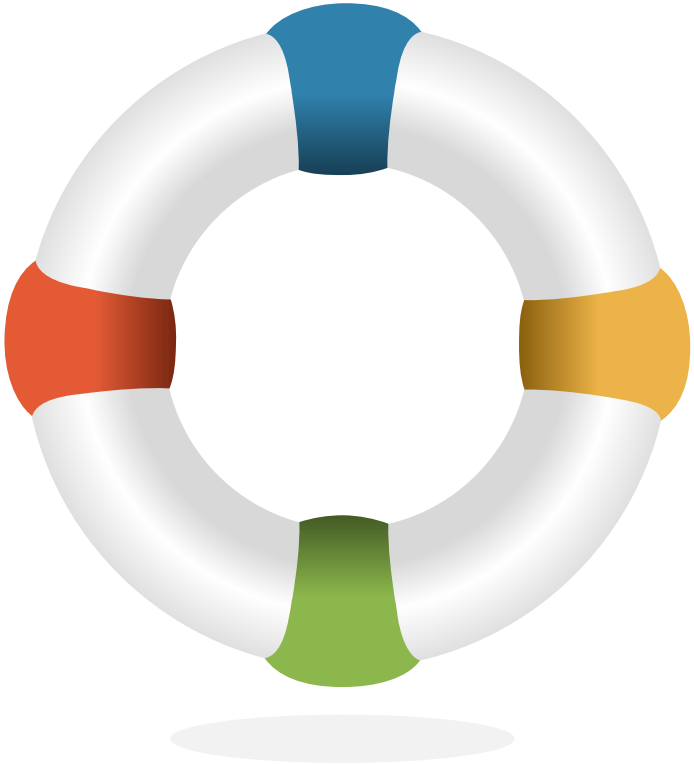
Essential Micronutrients Measured

Vitamins

A,C,E,D,K, B1, B2, B3 B6,
B9, B12,BIOTIN
K1, K2, MK 7

Minerals

BORON, CALCIUM,
CHROMIUM, COPPER, IODINE,
IRON, LITHIUM, MAGNESIUM,
MANGANESE, MOLYBDENUM,
SELENIUM, STRONTIUM,
VANADIUM, ZINC



Other Nutrients

CARNITINE, CHOLINE, COENZYME
Q10, GLUTATHIONE, INOSITOL,
LIPOIC ACID, OMEGA 3 DHA,
OMEGA 3 EPA, OMEGA 9

Amino Acids

LEUCINE, VALINE,ISOLEUCINE
LYSINE, METHIONINE, TYROSINE,
ARGININE, TRYPTOPHAN,
THREONINE,HISTIDINE

MICRONUTRIENT PANEL

R

VITAMINS

Bioti
Delta
tocotrienol MK4
MK7
Pantothenic
acid Vitamin A
Vitamin B1

131% Insufficient
130% Insufficient
118%

Vitamin
Vitamin B2
B3
Vitamin
B6
Vitamin
B9

115% Borderline

MINERALS

Boron
Calcium
Chromiu
m
Copper
Iodine

124% Insufficient
113%

Magnesium
Manganese
K1
Molybdenum
Selenium
Strontium
Vanadium

AMINO ACIDS

Arginine
Asparagine
Cysteine
Glycine
Histidine
Isoleucin
e Leucine

>140%Insufficient
>140%Insufficient
t 116%
Borderline

L-Tyrosine
Lysine
Methionine
Phenylalanin
e Taurine
Threonine
Tryptophan

>140%Insufficient
111% Borderline

OTHER NUTRIENTS

Glutamine
Carnitine
Choline
Coenzyme
Q10
Glutathione
Inositol

>140%Insufficient
>140%Insufficient
124% Insufficient

Lipoic Acid
Omega 3 DHA
Omega 3 EPA
Omega 9

100% - 109% Nutrient Sufficiency
110% - 119% Borderline
≥ 120% Insufficiency
Insufficiency*

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